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ABSTRACT

This report presents the findings of two surveys undertaken in 1969 and 1970 by the National Science Foundation to determine the effects of recent changes in Federal funding on various types of institutions of higher education; on faculty, graduate students, and postdoctoral fellows; on science program direction; and on other aspects of higher education. The findings are reported for the following categories: (1) expenditures for science activities; (2) budget categories affected; (3) manpower changes; (4) staff participation in research and teaching; (5) curtailment of research projects and major research facilities; (6) departments most seriously affected; (7) policy changes; and (8) major effects cited by central administration staff and department heads. The appendices contain: (1) analytical institutional tables; (2) analytical departmental tables; (3) basic data tables; and (4) the 1970 survey instrument. (AF)

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# impact of changes in FEDERAL SCIENCE FUNDING patterns on academic institutions

1968-70

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# Foreword

THE HEALTH OF ACADEMIC SCIENCE is a topic of increasing interest and considerable debate. The Federal Government plays an important role in funding academic science—providing about 40 percent of the funds—and thus affects the academic enterprise in a major way. However, except for data on the amount of Federal funding, little quantitative information has been available until now on the effects of recent changes in Federal funding on various types of institutions of higher education; on faculty, graduate students, and postdoctoral fellows; on science program direction; or on other aspects of higher education. Consequently, the National Science Foundation initiated a systematic survey to supplement the large amount of anecdotal information which had come to its attention.

This report contains the results of these surveys, which were conducted with the advice and cooperation of the higher education community. It is believed that the results not only clearly reflect some of the recent impacts resulting from changes in Federal funding, but that they also make possible some general conclusions. The Foundation is clearly aware of the fact that some of the more significant changes are subtle and difficult to detect through questionnaires. There is also some evidence in the reports from the institutions that continuation of current policies and practices may have additional major impacts at a later date. In the interest of maintaining our scientific and technological strength and leadership, the National Science Foundation will continue to watch the situation closely.

This study was carried out under the general supervision of Dr. Charles E. Falk, Director, Division of Science Resources and Policy Studies. Most of the survey efforts were handled by Justin C. Lewis, assisted by Felix H. I. Lindsay, staff members of the Office of Economic and Manpower Studies, Thomas J. Mills, Head.

WILLIAM D. MCELROY
*Director*
*National Science Foundation*

DECEMBER 1970

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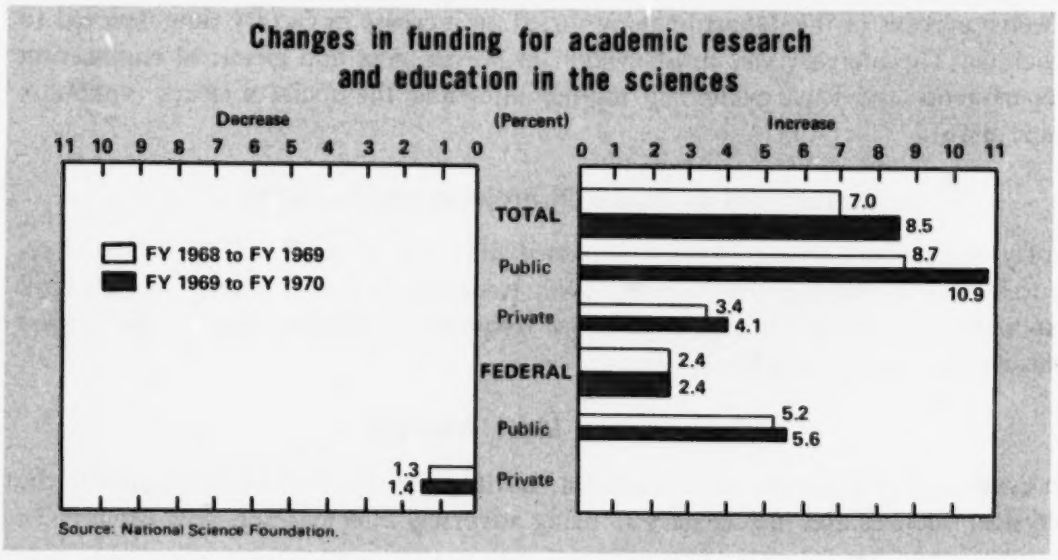
# Summary

THE REPLIES to two surveys, undertaken in spring 1969 and 1970, show that, while total expenditures for research and education in the sciences had increased over the 2-year period covered, these expenditures had not kept pace with the combined increases in general enrollment and higher costs. Expenditures from non-Federal funds compensated at least in part for the leveling trend of Federal funding. Private institutions, in general, and the largest public institutions reported the most serious curtailment of monies for science, and of Federal funds in particular.

Large numbers of academic officials reported impairment of graduate programs and research, curtailment of facilities and equipment, adverse career and employment impacts, administrative difficulties, and lowered morale of students and science faculty. New or developing institutions and departments frequently reported problems in meeting planned goals as a result of changes in Federal funding.

## Funding

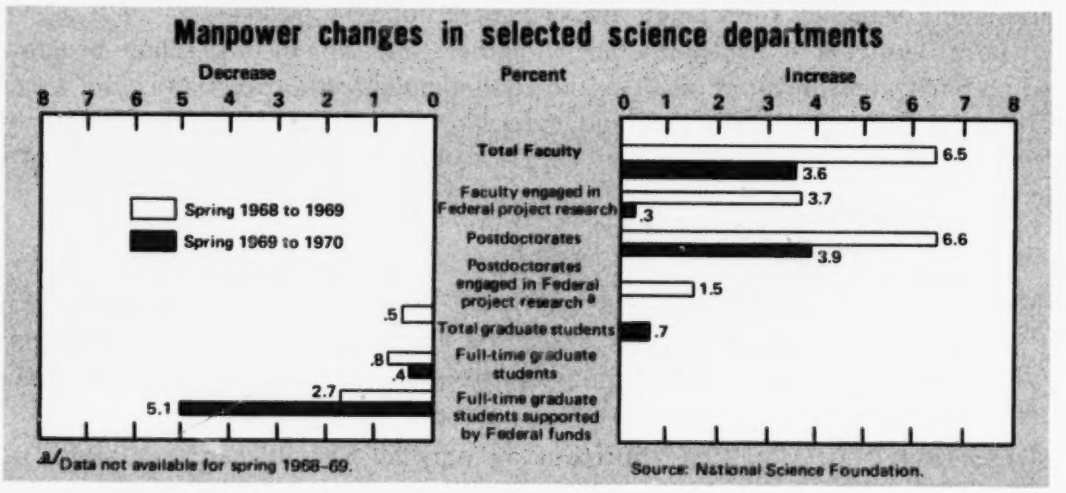
- Expenditures from all sources increased by 7 percent and 8.5 percent for fiscal years 1969 and 1970, respectively. This would not appear to be sufficient to keep pace with the effects of both a minimum 5-percent increase in costs per year and annual enrollment increases averaging over 6 percent per year (table 1).
- Expenditures of Federal funds increased by only 2.4 percent each year (table 1).
- Large universities and private institutions were hardest hit, each reporting an increase of 4 percent in expenditures for fiscal year 1970 which did not even cover the Nationwide increases in costs.
- Economics and psychology departments reported the largest increase in expenditures from fiscal year 1969 to fiscal year 1970, 16 percent and 12 percent, respectively. The smallest increases, 1 percent each, were reported by physics and electrical engineering departments (appendix table B-1.)



## Manpower

- Faculty and postdoctorates increased less than 4 percent in spring 1970 as compared to an almost 7-percent increase in the previous year (appendix table B-10).
- Graduate student enrollments remained essentially constant, but almost one-third of the departments reported policy changes pertaining to graduate programs; the effect of most of these changes would be to reduce the size of the programs (appendix tables B-13 and B-20).
- In all categories of personnel, those receiving some support from the Federal Government showed the smallest rate of growth; in the case of graduate students an actual decrease of 5 percent took place in 1969-70 in the number receiving some support from Federal funds (appendix table B-13).
- There was no evidence of a "stock-piling" of postdoctorates, which increased by 4 percent in spring 1970 over spring 1969. The possibility exists that short-term postdoctorates were not classified as "postdoctorates" by some department chairmen. Furthermore, only 1 percent of the departments reported a policy of increasing the size of the postdoctorate programs (appendix tables B-10 and B-21.)

**Manpower changes in selected science departments**




a/Data not available for spring 1968–69.

Source: National Science Foundation.

## Research and Teaching

- Over three-fourths of the chairmen indicated in spring 1970 that there was an adequate division of available research funds between senior and young investigators. The situation has remained relatively stable for several years in most fields. Overall, however, slightly fewer department heads reported an inadequate division of funds for junior staff in 1970 than in 1968 (table 4 and appendix table B-15).
- Twelve percent of the departments reported an increase in faculty time devoted to teaching. The increase was most evident in life sciences and electrical engineering departments and least evident in mathematics and the social sciences (appendix table B-16).

## Curtailment of Research Projects and Facilities

- Forty-one percent of departments reported that one or more federally funded research projects were entirely halted, with termination due to changes in Federal funding levels. Terminations were more frequent in departments in the largest universities (appendix table B-17).

## Departments Most Affected

- In evaluating a question on this subject, institutions reported most frequently the physical sciences and life sciences as being adversely affected (appendix table A-7).

# Introduction

THE NATIONAL SCIENCE FOUNDATION has conducted two surveys to obtain systematic and objective information on the impacts on universities associated with changes in Federal funding. The first such survey, conducted in 1969, was limited to certain specific changes in Federal funding. A second study conducted in 1970, examined the effects of the broad spectrum of the changes in Federal science funding patterns on academic institutions. Although the latter study covered, in general, similar types of information, it was broader in scope than the 1969 study. As in the earlier survey, the 1970 questionnaires were mailed in the spring of the academic year to a sample of 104 institutions of higher education granting doctorates in science fields. This group represents about one-half of all institutions granting doctorates in the sciences and includes institutions randomly selected to represent those receiving large amounts, modest amounts, and relatively small amounts of Federal funds for academic science.

One section of the questionnaire constitutes an evaluation of the impact of Federal science funding changes on the university as a whole and was completed by the central administration. Medical schools and Federally Funded Research and Development Centers (FFRDC's) were excluded. The other part was to be completed by the chairmen of departments granting the doctorate in 12 selected major science fields. Copies of the survey instruments and letters used for the 1969 and 1970 surveys are included in appendix D.

Because much of the data which were requested were not readily available, special collection efforts were required on the part of the institutions. However, the response rate to the survey was excellent. Furthermore, the institutions evinced considerable interest in the survey, as evidenced by their queries and by informative comments which accompanied the returned questionnaires. The National Science Foundation deeply appreciates the excellent cooperation received from the institutions.

The questionnaires for the more recent survey were mailed on April 3, 1970. Nonrespondents were followed up by one or more telephone calls in May and June. The survey was closed out in mid-July, at which time 86 institutional responses and 662 departmental responses were received. The total number of institutions and departments responding in each category are shown in the following tables. Some institutions and departments did not answer all questions.

| Federal funds for academic science, FY 1969[a] | Number of institutions receiving Federal funds for academic science | | | Number of departments responding |
|---|---|---|---|---|
| | Total | Surveyed | Respondents | |
| Total receiving funds | 2,109 | 104 | 86 | 662 |
| By institutional fund group: | | | | |
| (Millions of dollars) | | | | |
| Group I ($20 or more) | 33 | 21 | 18 | 192 |
| Group II ($10–$19) | 40 | 24 | 18 | 182 |
| Group III ($5–$9) | 49 | 23 | 22 | 166 |
| Group IV (less than $5) | 1,987 | 36 | 28 | 122 |
| By control of institution: | | | | |
| Public | 955 | 61 | 53 | 421 |
| Private | 1,154 | 43 | 33 | 241 |

[a] To facilitate comparison of the impact on different-size institutions, the universities have been grouped according to the total Federal funds obligated to them for academic science in fiscal year 1969 as reported to the National Science Foundation in the annual survey of Federal Support to Universities and Colleges.

| Selected fields of science | Number of departments responding |
|---|---|
| Total | 662 |
| Chemistry | 79 |
| Physics | 72 |
| Mathematics | 68 |
| Electrical engineering | 57 |
| Chemical engineering | 55 |
| Biochemistry | 43 |
| Biological sciences[a] | 66 |
| Microbiology | 46 |
| Physiology | 28 |
| Sociology | 41 |
| Economics | 43 |
| Psychology | 64 |

[a] Data for departments designated by chairmen as "biology" or "biological sciences" have been combined as "biological sciences" in all tables. Separate data were also collected from pharmacology departments for the use of the National Institutes of Health, but are not included in this report.

Wherever practicable, comparisons are made between data obtained in both the 1969 and 1970 "Impact" surveys. The report includes data from institutional questionnaires on changes in funding, sources of funds, reductions in major institutional research facilities, institutions' evaluations of the science departments or units most adversely affected, and qualitative institutional comments on policy changes and on other impacts attributable to changing patterns of Federal funding. Also included are data obtained from department heads on changes in funding, budget categories affected, changes in numbers of faculty, postdoctorates, and other staff. The department heads also provided data on graduate students and those supported by Federal funds, evaluation of the appropriateness of the division of available funds between young and senior investigators, effects on time spent in teaching, projects halted, reductions in major departmental research facilities, and qualitative departmental comments on policy changes and on other impacts attributable to changed funding patterns.

The following section of the report presents the principal findings. The section on principal findings is followed by detailed analytic tables on each of the subjects covered in the survey.

# Findings

## Expenditures for Science Activities

### General

Expenditures for academic science (research and education) rose in fiscal years 1969 and 1970 by an average of 8 percent per year, but expenditures did not keep pace with increases in college enrollments and costs (table 1). In terms of constant dollars[1] the increase in expenditures from fiscal year 1968 to fiscal year 1970 was substantially less—5 percent. Since college students at all levels make demands on science education resources, it should be noted that during the same 1968–70 period total college enrollments rose by 13 percent. The net results of both increased cost and enrollment factors is, therefore, a decline in the effective support of academic science of between 5 and 10 percent since fiscal year 1968.

The smallest percentage increase from 1969 to 1970 in total science funds expended was experienced by institutions receiving $20 million or more in Federal support for academic science (Group I). The increase for this group did not even compensate for cost increases. This is particularly significant in view of the fact that these institutions represent the strongest academic science centers in the Nation. A decrease in total funds expended for science was reported for Group IV private institutions. This contrasted with the sizable increase in Group IV public institutions.

The aggregate changes in expenditures cited conceal the effect of funding changes in individual institutions. Although total funds expended for research and education in the sciences increased, 16 percent of the institutions surveyed reported that they expended less in 1970 than in 1969 (chart 1); 40 per-

[1] The gross national product implicit price deflator of the Department of Commerce was used to determine the amount of inflation.

TABLE 1.—TOTAL, FEDERAL, AND NON-FEDERAL FUNDS EXPENDED FOR ACADEMIC RESEARCH AND EDUCATION IN THE SCIENCES, BY INSTITUTIONAL FUND GROUP AND CONTROL OF INSTITUTION, FISCAL YEARS 1968, 1969, AND 1970

| Year and institutional fund group | Total institutions | | | Public institutions | | | Private institutions | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total funds | Federal funds | Other funds | Total funds | Federal funds | Other funds | Total funds | Federal funds | Other funds |
| | Percent change, FY 1968–FY 1969 and FY 1969–FY 1970 | | | | | | | | |
| FY 1968–FY 1969 | 7.0 | 2.4 | 10.9 | 8.7 | 5.2 | 10.9 | 3.4 | —1.3 | 10.8 |
| FY 1969–FY 1970 | 8.5 | 2.4 | 12.8 | 10.9 | 5.6 | 13.7 | 4.1 | —1.4 | 10.4 |
| FY 1968–FY 1970 | 16.1 | 4.9 | 25.1 | 20.5 | 11.1 | 26.1 | 7.6 | —2.7 | 22.3 |
| | Percent change, FY 1969–FY 1970, by institutions grouped by Federal obligations received for academic science, FY 1969 | | | | | | | | |
| (Millions of dollars) | | | | | | | | | |
| Group I ($20 or more) | 4.3 | 0.0 | 9.1 | 4.7 | 2.6 | 6.3 | 3.9 | —1.6 | 12.6 |
| Group II ($10–$19) | 14.7 | 5.2 | 20.0 | 15.7 | 6.4 | 20.6 | 1.1 | —5.0 | 8.8 |
| Group III ($5–$9) | 7.9 | 5.6 | 8.9 | 7.6 | 6.2 | 8.2 | 8.4 | 4.6 | 10.1 |
| Group IV (Less than $5) | 12.1 | 8.1 | 13.0 | 16.5 | 17.0 | 16.2 | —.9 | —7.0 | 1.8 |

Note: See appendix tables C-1, C-2, and C-3 for dollar amounts on which percentages are based.

cent reported increases of less than 10 percent; and 12 percent reported increases of over 25 percent in total funds expended (appendix table A-1). Increases of the latter magnitude were reported only by institutions in Groups II, III, and IV, and almost exclusively by public institutions. The adverse position of the private institutions is reflected by the fact that 28 percent reported cutbacks from 1969 to 1970 in overall spending for science compared to 9 percent of the public institutions.

## Type of institution

Public institutions reported that their total expenditures for science rose 11 percent in 1970 following an increase of 9 percent reported in 1969. Thus, in an overall sense, expenditures for science in public institutions seem to have kept pace with enrollment growth and cost increases. This resulted from increases in the proportion of funds provided from non-Federal sources, which replaced the slower growing funding from the Federal Government. Federal funds constituted one-third of the total funds utilized for research and science education in the public institutions reporting in 1970.

Private institutions reported considerably smaller increases in total expenditures in both periods—4 percent from 1969 to 1970 and 3 percent from 1968 to 1969. In this case the non-Federal funds were insufficient to compensate for actual decreases in the Federal contribution. One-half of the science funds spent by private institutions in the sample came from Federal sources.

## Federal funds

Federal funds expended for research and education in the sciences increased about 2½ percent per year from 1968 to 1969 and from 1969 to 1970. In 1970 Federal funds constituted about 40 percent of all funds expended for academic science in the institutions surveyed. Public institutions reported increases of about 5 percent a year in Federal funds from 1968 to 1969 and from 1969 to 1970, but there was a decline in both periods of 1½ percent in Federal funds in the private institutions surveyed (table 1).

Federal funds expended for science, both for all institutions combined and public institutions, increased from 1969 to 1970 in inverse relationship to the total amount of Federal obligations made available. However, this was not the case with private institutions. Public Group IV institutions reported an increased 17 percent in Federal funds for science; while private Group IV institutions reported a decrease of 7 percent.

More than one-third of all institutions reported a decline in total Federal funds expended in 1970—59 percent of the private, compared to 23 percent of the public institutions (chart 1 and appendix table A-2).

## Non-Federal funds

The non-Federal funds expended for science increased 25 percent from 1968 to 1970. This parallels the requirements of increased enrollments and costs, though this was not the case with the Federal contributions. Non-Federal funds spent for academic science constitute about 60 percent of expenditures for academic science in 1970 in the reporting institutions. Non-Federal funds rose 13 percent in fiscal year 1970; the increase for public institutions in the sample was 14 percent and that for private institutions, 10 percent. Both public and private institutions surveyed reported increases of 11 percent from 1968 to 1969 (table 1).

Non-Federal expenditures for science increased most from 1969 to 1970 for the Group II institutions (up 20 percent) and for Group IV institutions (up 13 percent), primarily due to increases in public institutions.

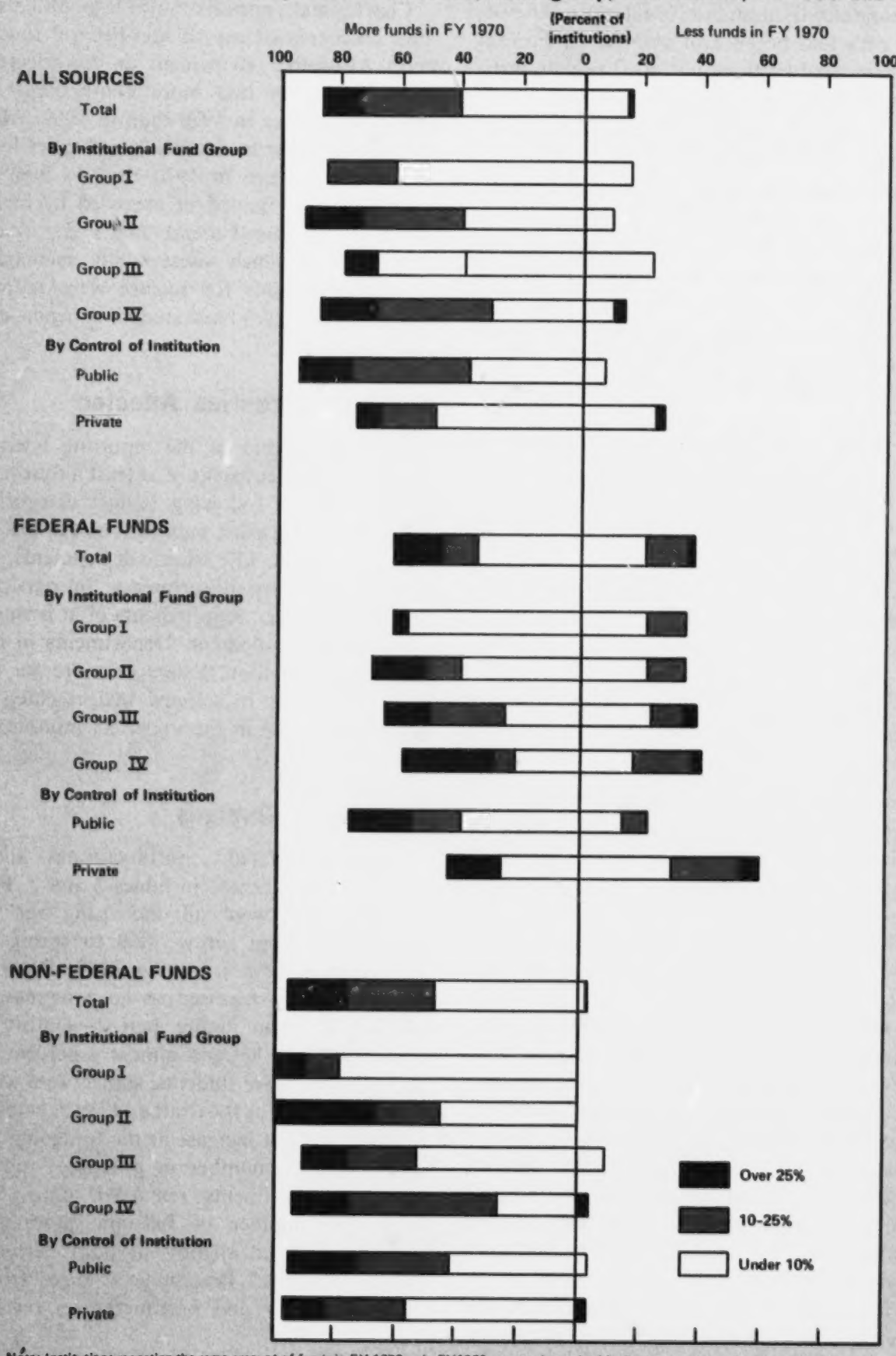
Approximately 95 percent of the institutions surveyed reported increases in expenditures of non-Federal funds for science from 1969 to 1970. Almost one-half reported increases of 10 percent or more (chart 1 and appendix table A-3).

The inability to "keep up" by using non-Federal funds to compensate for reduction in Federal funding was evidenced particularly by the private institutions. Nearly one-half of the private institutions reported that they were unable to compensate for decreases in Federal funds expended (appendix table A-4). This was considerably more than the one-fourth reported for a year earlier. Only 58 percent of the institutions expending fewer Federal funds in 1970 than in 1969 reported that the reduction was at least equaled by increased expenditure of non-Federal funds for science education and research. In the 1969 survey, 69 percent stated that reductions in Federal funds from 1968 to 1969 were at least equaled by increases in non-Federal funds.

Two-thirds of the public institutions reported compensating non-Federal expenditures in the 1970 survey, about the same percentage as reported for a year earlier. Apparently more of the private institutions are retrenching.

The chief sources of increased non-Federal funds among public institutions were State governments (all reporting this source), followed by student tuition and fees reported by three out of five (appendix

Chart 1. **Institutions reporting changes in expenditures for research and education in the sciences, by source of funds, fund group, and control, FY 1969 and 1970**




Note: Institutions reporting the same amount of funds in FY 1970 as in FY1969 are not shown in this chart.

Source: National Science Foundation.

table A-5). Among private institutions, the chief sources of non-Federal "compensating" funds, in order, were student tuition and fees, endowment earnings, foundations, and individual gifts. Use of endowment principal because of changes in Federal funding was reported by three out of 33 private institutions in the sample.

### Fields of science

Expenditure data were also obtained from individual departments in the selected fields surveyed. All fields showed increased expenditures for research and education in the sciences from 1969 to 1970. The largest increases were reported by economics and psychology department heads; the smallest changes reported were in physics and electrical engineering. (See appendix table B-1 for data by source of funds.)

| Field | Percent increase in expenditure |
|---|---|
| Chemistry | 7 |
| Physics | 1 |
| Mathematics | 9 |
| Electrical engineering | 1 |
| Chemical engineering | 7 |
| Biochemistry | 6 |
| Biological sciences | 4 |
| Microbiology | 4 |
| Physiology | 8 |
| Sociology | 6 |
| Economics | 16 |
| Psychology | 12 |

Almost a third of the selected departments reported expending fewer funds for science in 1970 than in 1969 but the majority of these said their reductions were under 10 percent. (See chart 2 and appendix table B-2 for data by field.)

The surveyed department heads also indicated that expenditures of funds from Federal sources declined 5 percent or more in physics, electrical engineering, biological sciences, and sociology departments but increased over 10 percent in economics and psychology departments (appendix table B-1). Almost one-half of the surveyed departments said they spent less Federal monies for science in 1970 than in 1969; a third of the surveyed departments said the Federal funds spent in 1970 for science were at least 10 percent below the amounts spent in 1969. (See chart 2 and appendix tables B-3—B-5 for data by field and type of Federal funding.)

The saving grace of the non-Federal funds for science education and research is reflected in reports from the various fields. All fields covered in the survey reported substantial increases in expenditures for science from non-Federal sources. The range of increases by field shown for this source in appendix table B-1 is from 8 percent to 18 percent.

Chart 2 and appendix tables B-6—B-8 also contain data on increased use of non-Federal funds for science. Altogether 80 percent of the selected departments said they had more non-Federal money to spend for science in 1970 than in 1969. Almost one-half of the departments which had spent less Federal money for science in 1970 than in 1969 said this reduction was equaled or exceeded by increased expenditure of non-Federal funds for science. The purposes for which substantially increased use of non-Federal funds for science were reported most frequently were graduate student stipends, equipment, and supplies.

## Budget Categories Affected

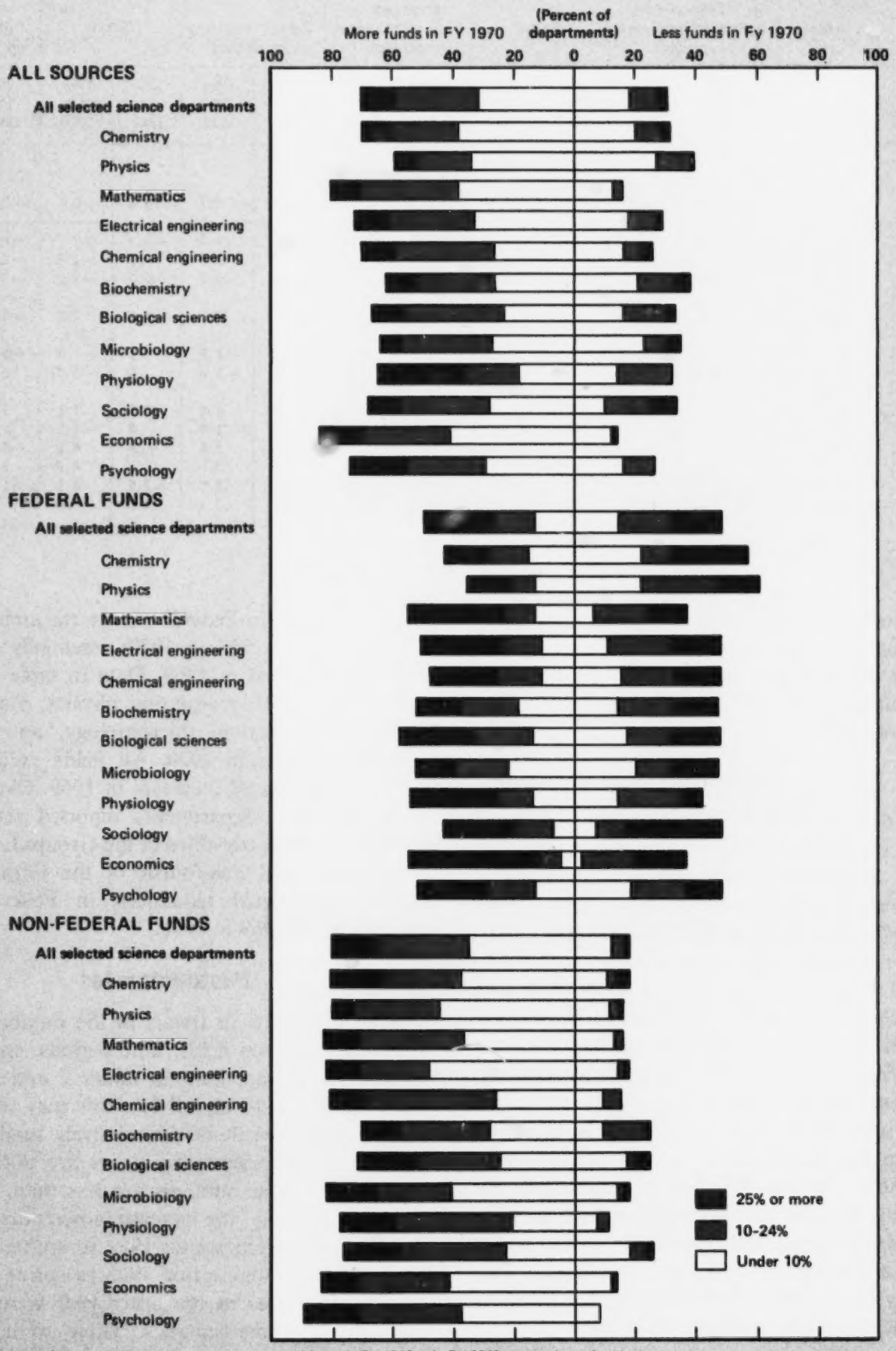
Over 10 percent of the reporting science departments reported cutbacks of at least a fourth from 1969 to 1970 in the following budget categories: equipment, travel, supplies, publications. Almost 20 percent cited equipment. Life science departments, in general, and biochemistry departments, in particular (one-half of the latter), reported cuts of at least one-fourth in funds for equipment. Departments in institutions receiving $5 million dollars or more for science reported cutbacks in selected budget categories more often than those in the under $5 million group (appendix table B-9).

## Manpower Changes

Changes in faculty, postdoctorates, and graduate students are indicated in tables 2 and 3. Faculty and postdoctorates were still increasing but at a much slower rate from spring 1969 to spring 1970 than from spring 1968 to spring 1969. Both groups of personnel were reported to have increased over 10 percent over the entire period—almost 7 percent from 1968 to 1969 and almost 4 percent from 1969 to 1970. Graduate students, subject to a wider variety of impacts such as the draft and lower rates of Federal support, did not increase as the foregoing two groups did. The total number of graduate students in the sampled departments remained almost unchanged while the number of full-time graduate students actually declined slightly in both periods (by less than 1 percent).[2] Percentage changes from 1969 to 1970 in faculty and postdoctorates on Federal re-

[2] The population base in ages 23–27 increased 11 percent from 1968 to 1970.

## Chart 2. Selected science departments reporting changes in expenditures for research and education in the sciences, by source of funds, FY 1969 and 1970




Note: Departments reporting the same amount of funds in FY 1970 as in FY 1969 are not shown in this chart.
Source: National Science Foundation.

TABLE 2.—PERCENT CHANGES IN MANPOWER, BY FIELD, SPRING 1968 TO 1969 AND 1969 TO 1970

| Selected science departments, by field | Faculty | | | | Postdoctorates | | | | Total graduate students | | Full-time graduate students | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Engaged in Federal research project | | Total | | Engaged in Federal research project | | | | Total | | Supported by Federal funds | |
| | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 |
| All selected science departments | 6.5 | 3.6 | 3.7 | 0.3 | 6.6 | 3.9 | NA | 1.5 | −0.5 | 0.7 | −0.8 | −0.4 | −2.7 | −5.1 |
| Chemistry | 6.0 | 4.5 | 4.4 | 1.4 | 1.5 | 5.6 | NA | 2.0 | −1.7 | −.7 | −2.4 | −2.7 | −4.5 | −7.1 |
| Physics | 7.9 | 2.4 | 4.7 | −1.0 | 7.7 | 1.8 | NA | −2.2 | 1.3 | −2.1 | .0 | −1.9 | −2.8 | −6.1 |
| Mathematics | 5.2 | 3.2 | −.1 | −5.8 | −4.1 | 16.0 | NA | (a) | −4.5 | −2.2 | −5.2 | −3.2 | −9.8 | −9.8 |
| Electrical engineering | 7.0 | 3.2 | 3.4 | −1.7 | 21.2 | 21.2 | NA | 24.2 | −4.1 | 2.6 | −5.6 | 2.6 | −5.1 | −7.5 |
| Chemical engineering | 3.2 | 6.0 | 1.1 | 4.7 | 14.3 | −3.6 | NA | 2.3 | 1.3 | −1.9 | −.1 | −.3 | −5.6 | −9.4 |
| Biochemistry | 5.7 | 5.5 | 3.3 | 1.5 | 4.7 | 5.0 | NA | 5.7 | −.1 | −3.8 | .0 | −5.0 | 1.0 | −7.3 |
| Biological sciences | 9.4 | 3.9 | 7.7 | 2.6 | 19.0 | .8 | NA | 1.0 | 2.5 | 2.0 | 2.5 | 1.1 | 3.5 | .8 |
| Microbiology | 4.6 | 1.9 | 3.4 | −3.0 | 6.1 | −1.2 | NA | −4.4 | .1 | −1.9 | .0 | −1.2 | .9 | −1.9 |
| Physiology | 5.5 | 5.2 | 1.9 | 4.7 | 9.3 | −2.2 | NA | −4.1 | −1.2 | 3.4 | −1.8 | 4.1 | −3.1 | −.6 |
| Sociology | 6.4 | 5.0 | 6.3 | −2.5 | (a) | (a) | NA | (a) | 5.9 | 3.0 | 7.2 | 4.9 | 8.7 | −7.6 |
| Economics | 8.3 | 4.7 | 1.4 | 6.1 | (a) | (a) | NA | (a) | −2.2 | 6.0 | −2.6 | 3.8 | −11.5 | −4.6 |
| Psychology | 5.5 | 2.4 | 3.4 | 6.0 | 22.0 | −9.5 | NA | −4.9 | 3.2 | 3.7 | 3.8 | −.9 | .3 | 1.3 |

a Percent not shown because base number less than 25.
NA=Not available.

search projects were also very small. On the other hand, graduate students supported by Federal funds significantly declined—8 percent—since the spring of 1968. Two-thirds of the decrease occurred from spring 1969 to spring 1970.

## Faculty

Detailed data in table 2 reveal that departments in all fields surveyed except chemical engineering, physiology, and biochemistry showed significantly smaller increases in science faculty from spring 1969 to spring 1970 than from spring 1968 to spring 1969. Overall, the increase was 6.5 percent from 1968 to 1969 and 3.6 percent from 1969 to 1970. (See also appendix tables B-10 and B-11.) Table 3 shows that departments in Group I institutions reported the smallest increase in number of faculty (7.6 percent) for the entire period surveyed and that departments in private institutions reported smaller increases in faculty than did departments in public institutions. Both of these phenomena are consistent with the relatively low funding increases in these types of institutions. In terms of the number of departments, 20 percent of the departments had reductions in full-time faculty from 1969 to 1970. Over 25 percent of Group I departments reported reductions.[3] Science faculty engaged in Federal science research increased 4 percent from 1968 to 1970; essentially all of the increases occurred in 1969. Data in table 2 and appendix table B-10 reveal that physics, mathematics, electrical engineering, microbiology, and sociology reported declines in 1970. All fields except mathematics had reported increases in 1969. Over the two years, Group I departments reported the smallest increases. About one-third of the Groups I, II, and III departments and one-fourth of the Group IV departments reported reductions in Federal project research from 1969 to 1970.

## Postdoctorates

Wide variations in trends in the number of postdoctorates between fields, time periods, and types of institutions are apparent in tables 2 and 3 and appendix tables B-10 and B-11. This may in some instances be the result of the relatively small numbers in certain categories (percentages are not shown in tables where base numbers are less than 25). As in the case of faculty, the increase in postdoctorates was much smaller from spring 1969 to spring 1970—3.9 percent—than from spring 1968 to spring 1969—6.6 percent. Increases in the latter year were larger in chemistry and mathematics. There were unusually large increases in electrical engineering in both years—21 percent. The data, in any event, do not support

[3] Detailed data on number of departments reporting changes in manpower discussed in text are not shown in the tables.

TABLE 3.—PERCENT CHANGES IN MANPOWER, BY INSTITUTIONAL FUND GROUP AND CONTROL OF INSTITUTION, SPRING 1968 TO 1969 AND 1969 TO 1970

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Faculty | | | | Postdoctorates | | | | Total graduate students | | Full-time graduate students | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Engaged in Federal research project | | Total | | Engaged in Federal research project | | | | Total | | Supported by Federal funds | |
| | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 |
| All selected science departments | 6.5 | 3.6 | 3.7 | 0.3 | 6.6 | 3.9 | NA | 1.5 | −0.5 | 0.7 | −0.8 | −0.4 | −2.7 | −5.1 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | | | |
| Group I ($20 or more) | 3.8 | 3.5 | .6 | .9 | 3.8 | 2.6 | NA | .9 | −3.0 | −.5 | −3.5 | −1.0 | −5.0 | −4.4 |
| Group II ($10 to $19) | 7.7 | 4.0 | 6.1 | 1.9 | 10.6 | 7.0 | NA | 3.4 | .4 | .3 | −.4 | .3 | −2.5 | −3.9 |
| Group III ($5 to $9) | 8.3 | 2.2 | 7.5 | −3.0 | 10.9 | −1.8 | NA | −3.0 | 2.5 | 3.3 | 2.2 | .1 | .5 | −9.6 |
| Group IV (Less than $5) | 7.4 | 5.5 | 3.4 | −1.3 | 1.9 | 38.5 | NA | 26.8 | .8 | 1.8 | 3.6 | −.6 | 1.5 | −4.8 |
| By control of institution: | | | | | | | | | | | | | | |
| Public | [a]7.3 | 3.9 | [a]5.3 | .1 | NA | 3.2 | NA | −1.0 | NA | .0 | NA | .1 | NA | −6.0 |
| Private | [a]5.5 | 3.0 | [a]1.7 | .6 | NA | 4.7 | NA | 4.2 | NA | 1.9 | NA | −1.5 | NA | −3.7 |

[a] Derived from institutional reports. All other figures from departmental reports.

anecdotal reports of widespread increases in postdoctorates. The possibility exists that short-term postdoctorates were not classified as "postdoctorates" by some department chairmen. Only about 1 percent of the departments reported a policy of increase in their postdoctoral programs (appendix table B-21). Eighteen percent of all responding departments cut back the number of full-time postdoctorates in the past year; 35 percent of the chemistry departments cut back. Cutbacks were also much more likely in Group I departments (27 percent) and least frequent in Group IV departments (5 percent); similar proportions of departments in public and private institutions reported that they had a cut in full-time postdoctorates. Sixteen percent of all departments surveyed reported cutbacks in postdoctorates on Federal research projects; cutbacks were reported most frequently by Group I departments (26 percent) and least frequently by Group IV departments (4 percent). The percentage of departments in public and private institutions cutting back was about the same.

## Graduate students

Table 2 also reveals that the largest decline in graduate students from 1968 to 1970 was reported by heads of mathematics departments (total down 7 percent and full-time down 8 percent). Chemistry and biochemistry departments also reported decreases in the number of full-time students of 5 percent or more for the whole period. An increase of over 12 percent in full-time students over the period was reported by sociology departments. Mathematics departments reported a drop of 10 percent each year, or 19 percent from 1968 to 1970 in students supported by Federal funds. Departments in Group I institutions reported the biggest percentage drop in all graduate students, in full-time graduate students, and in those supported by Federal funds.

In spite of the small changes in numbers of graduate students, a large number of departments had reductions from 1969 to 1970; almost one-half reported reductions in full-time graduate students, and one-fourth reported reductions of 10 percent or more. Departments in larger institutions (Group I and II) and in private institutions had a slightly higher incidence of reductions. All in all, reductions in full-time graduate students on Federal funds were reported from 1969 to 1970 by one-half of the surveyed departments. Considerably over one-half of the chemistry, physics, electrical engineering, and biochemistry departments reported reductions in graduate students supported by Federal funds. Losses in full-time graduate students supported from Federal research projects were not distributed as widely as losses in students with other types of Federal support from 1969 to 1970. Only 37 percent of the departments reported reductions; only about one-fourth of the departments in Group IV institutions reported reductions. The Group I figure was the highest—45 percent with reductions. One-half of the departments reported

reductions in the number of full-time graduate students supported by "other" Federal funds. Proportionately more of the physical science and mathematics departments reported cuts in full-time graduate students supported by "other" Federal funds. Fewer departments in Group IV than departments in the other groups reported reductions in this category of students. One-third of the departments reported actual reductions in numbers of graduate students supported by non-Federal funds.

### Other professional staff

Full-time professionals, other than faculty or postdoctorates increased by 4 percent in each of the years studied (appendix table B-11). The likelihood of departments having reductions in full-time "other professionals" increased as the Federal funds for science increased. Thirteen percent of all departments reported reductions in "other professionals," but they ranged from less than 10 percent of departments in Group IV institutions to 20 percent in Group I institutions. Only 11 percent of the responding departments reported reductions in full-time "other professionals" on Federal research projects in the year.

### Technicians

The number of science and engineering technicians in the science departments surveyed declined slightly for 2 years running; a total loss of about 3 percent among full-time technicians was reported from spring 1968 to spring 1970. Apparently this type of personnel has been affected to a greater extent, and perhaps sooner, by tight budgets than have other types of personnel. Departments in Group IV institutions reported a gain of almost 18 percent in full-time technicians from 1968 to 1970 (appendix table B-12). Overall, 13 percent of the surveyed departments reported reductions in technicians from 1969 to 1970, but there were significant variations in certain groups. One-fourth of the physics departments and approximately one-third of biochemistry and physiology departments reported reductions in technicians over this period. Twenty-three percent of departments in Group I but only 4 percent of departments in Group IV reported reductions.

## Staff Participation in Research and Teaching

There has been some anecdotal information that new doctorates were not being provided an appropriate proportion of available research funds. In view of the importance of support of new researchers, the National Science Foundation surveyed the situation in selected science departments in the spring of 1968 and found that three-fourths of the surveyed department chairmen felt that there was an adequate division of available research funds for new doctorates.[4] Since changes in Federal funding could cause the situation to deteriorate, the 1969 and 1970 "Impact" surveys included questions on this subject. Responses from department chairmen indicated that the situation had not worsened. An adequate division of funds for junior staff was reported in 1969 and 1970 —79 percent and 78 percent, respectively. This compares with 75 percent in 1968. Table 4 shows the proportion of departments reporting an inadequate division of funds for junior staff by field in various years. (See also appendix table B-15.)

Department heads also were asked to compare the time faculty spent on teaching in the 1969–70 academic year with the time spent on teaching in the 1967–68 year. Eighty-four percent said the proportion of time in teaching each year was about the same. Twelve percent indicated a greater proportion of time was spent in teaching in 1969–70, and about a third of these, or 4 percent, reported that the increase was attributable to changes in Federal funding. Four percent said a smaller proportion of time was spent in teaching in 1969–70, and three-fourths of

[4] See National Science Foundation, *Support and Research Participation of Young and Senior Academic Staff, 1968* (NSF 68-31) (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1968).

TABLE 4.—APPROPRIATENESS OF DIVISION OF RESEARCH FUNDS BETWEEN JUNIOR [a] AND SENIOR [b] STAFF

| Selected science departments, by field | Percent of departments reporting inadequate division of funds for junior staff | | |
|---|---|---|---|
| | FY 1968 | FY 1969 | FY 1970 |
| All selected science departments | 24.9 | 20.4 | 21.7 |
| Chemistry | 34.4 | 27.1 | 26.9 |
| Physics | 28.9 | 23.4 | 24.3 |
| Mathematics | 24.7 | 23.3 | 27.4 |
| Electrical engineering | 25.7 | 15.1 | 8.9 |
| Chemical engineering | 18.6 | 21.2 | 18.5 |
| Biochemistry | 30.8 | NA | 38.1 |
| Biological sciences | 14.9 | 28.8 | 23.1 |
| Microbiology | 16.7 | 19.5 | 26.7 |
| Physiology | 16.7 | 22.2 | 23.1 |
| Sociology | 31.6 | 14.9 | 18.4 |
| Economics | 21.8 | 16.3 | 9.3 |
| Psychology | 16.2 | 12.1 | 14.8 |

[a] Seven years or less from the Ph.D.

[b] More than seven years from Ph.D.

Note: FY 1968 data may not be strictly comparable to FY 1969 and FY 1970 because of a change in the format of the wording on the survey question. Figures rounded to the nearest one-half percent.

these attributed the decrease to changes in Federal funding. (Appendix table B-16 shows data by field, funding group, and control.)

## Curtailment of Research Projects and Major Research Facilities

Forty-one percent of the departments surveyed reported that federally funded research projects had been halted entirely in fiscal year 1969 or fiscal year 1970 because of changes in Federal funding; 20 percent reported temporary halt of some federally funded research projects (appendix table B-17). There was an average of one federally funded research project halted entirely for each responding department, with a slightly higher number per department for Group I departments. Projects were reported halted relatively more frequently among departments in private institutions than among departments in public institutions. The department heads said that 30 percent of the projects halted entirely would not be reactivated regardless of the subsequent Federal funding situation; 7 percent was expected to be reactivated with support from non-Federal sources.

One-fourth of the institutions reported reductions in the operational level of major institutional research facilities since 1968 due to changes in Federal funding. There was an average of two major facilities reported reduced for each institution by those reporting reductions (appendix table A-6). The most prevalent types of major institutional facilities reported reduced were computer centers and separate research laboratories. One-seventh of the surveyed department heads also reported reductions in the operational level of major departmental research facilities since 1968 (appendix table B-18). The latter reported an average of one and a one-half major research facilities reduced for each department.

## Departments Most Seriously Affected

Institutions were asked to identify the departments most seriously affected by changes in Federal funding patterns. Physical science departments were cited most frequently—44 times among 86 institutions reporting. Physics departments were reported to be adversely affected by 21 of the respondents; and chemistry departments, by 19. This means that almost one-fourth of all respondents mentioned one or both of these disciplines. Life science departments were mentioned 31 times as being among those most hurt by changes in Federal funding. The social science and engineering departments appear to have been less affected than the physical and life science departments, as viewed by university officials in the sample. The critical effects reported most frequently by the central administration for the most adversely affected departments were impairment of graduate study and research programs. Other problems cited frequently were related to reductions in equipment and construction, impairment of career development, and other employment problems (appendix table A-7).

## Policy Changes

A substantial portion of the institutions changed policy or practice regarding initiating or accepting awards under Federal programs (appendix table A-8). Most changes dealt with procedures related to submittal of proposals. The changes cited at the institutional level most often related to stricter review of proposals before submittal to assure quality, and to the forwarding of proposals to additional or new Federal agencies.

Department heads were also queried as to policy or practice changes with respect to awards under Federal programs. Relatively few department heads (14 percent) said they changed their policies or practices toward Federal awards (appendix table B-19). Responses indicated more changes in practice because of new circumstances than of deliberate department policy changes. A fourth of those who made changes said they were reducing the number of proposals and almost as many (one-fifth) said they would be submitting more proposals. Thirteen percent of those changing said they would shift the emphasis of their research, for example, to environmental problems.

A policy of reducing graduate programs was indicated by a number of department heads. One-third said they made changes regarding the admission of new graduate students because of changes in Federal funding. One-fourth of all of the surveyed departments reported that they had reduced the size of their graduate programs, due in whole or in part to changes in Federal funding patterns. Departments in private institutions reported this type of policy change more frequently than those in public institutions (29 percent and 20 percent, respectively). Reduction in program size because of Federal funding changes was correlated with the amount of Federal funds received, ranging from 29 percent of Group I departments to only 13 percent of Group IV departments. Other types of policy changes regarding admission of new graduate students which were attributable at least in part to changes in Federal funding were raising standards, reducing support per student, and reducing the number of foreign students (appendix table B-20).

One-seventh of the departments changed some policies regarding postdoctorates. One-ninth of all departments reported that they reduced their postdoctorate programs because of changes in Federal funding patterns. Eight of the institutions in the sample surveyed said they increased the size of their programs for this reason. Almost one-fourth of Group I departments reduced their programs. Twice as large a proportion of the private institution departments than of public institution departments cut back their postdoctorate programs—17 percent versus 8 percent (appendix table B-21).

## Major Effects Cited

Central administration staff and department heads were both given an opportunity to provide comments concerning the impact of changes in Federal funding patterns in addition to answering specific structured questions. These departmental and institutional free responses, which were provided independently, showed a high degree of consistency. Over one-half of the institutional respondents took advantage of this opportunity to air particular problems. Respondents for one-third of the institutions in the survey mentioned that graduate programs were impaired. Almost one-third cited institutional problems. Most frequently the latter related to problems of new or emerging institutions or departments; next were institutional problems related primarily to planning. One-sixth said that their research efforts had been adversely affected and that this had serious implications for the future of science, nationally. For example, one institution indicated ". . . if the present constraints on Federal support remain . . . our potential contributions to our national defense, to the country's scientific manpower pool and to solutions of the problems of mankind will be clearly diminished." Other problems, each cited by significant numbers—at least five of the university administrators—related to institutional solvency and other financial difficulties, morale, problems of new research investigators, inadequacy of facilities or equipment, and postdoctoral appointments. Typical quotations among the 10 institutions which reported financial difficulty were:

"More institutional funds being used to phase out federal projects that are being dropped or reduced in funding level."

"The general cuts in student support and training programs come at a time when increased financial pressures on already strained institutional resources have necessitated tuition increases. Even with these increases the University is facing a substantial operating deficit for FY 1971."

". . . total expenditures were up a little less than 4%, or, because of inflation, not enough to permit any growth at all. . . . Much of the increased use of internal funds has been in the form of more rapid utilization of budgeted funds, amounting to the depletion of operating capital and much from the contingency reserves. . . . These can only be temporary measures."

Morale comments included items such as: "There is, among our principal investigators, a general malaise related to student, public and legislative attitudes toward academic research. . . ." Ten out of the 86 institutions in the survey called attention to the growing problems impending in the near future. Seven out of the 10 were private institutions.

Department chairmen's independent comments were generally very similar. Twenty-seven percent of the department heads reported impairment of graduate programs; 17 percent reported that research efforts were impaired, and 14 percent reported administrative or financial problems (appendix table B-22).

# APPENDIXES

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B. Analytical departmental tables
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# APPENDIX A

# Analytical Institutional Tables


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*TABLE A–1.—Institutions reporting changes in expenditures from all sources for research and education in the sciences, by institutional fund group and control of institution, FY 1969 to FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Total institutions reporting | | Percent of institutions reporting— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Less than 10 percent | 10–25 percent | More than 25 percent | | | Less than 10 percent | 10–25 percent | More than 25 percent |
| All institutions | 85 | 100.0 | 83.5 | 40.0 | 31.8 | 11.8 | 0.0 | 16.5 | 15.3 | 0.0 | 1.2 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | |
| Group I ($20 or more) | 18 | 100.0 | 83.3 | 61.1 | 22.2 | .0 | .0 | 16.7 | 16.7 | .0 | .0 |
| Group II ($10 to $19) | 18 | 100.0 | 88.9 | 38.9 | 33.3 | 16.7 | .0 | 11.1 | 11.1 | .0 | .0 |
| Group III ($5 to $9) | 21 | 100.0 | 76.1 | 38.1 | 28.6 | 9.5 | .0 | 23.8 | 23.8 | .0 | .0 |
| Group IV (Less than $5) | 28 | 100.0 | 85.7 | 28.6 | 39.3 | 17.9 | .0 | 14.3 | 10.7 | .0 | 3.6 |
| By control: | | | | | | | | | | | |
| Public | 53 | 100.0 | 90.6 | 35.8 | 39.6 | 15.1 | .0 | 9.4 | 9.4 | .0 | .0 |
| Private | 32 | 100.0 | 71.9 | 46.9 | 18.8 | 6.3 | .0 | 28.1 | 25.0 | .0 | 3.1 |

*TABLE A–2.—Institutions reporting changes in expenditures of Federal funds for research and education in the sciences, by institutional fund group and control of institution, FY 1969 to FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Total institutions reporting | | Percent of institutions reporting— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Less than 10 percent | 10–25 percent | More than 25 percent | | | Less than 10 percent | 10–25 percent | More than 25 percent |
| All institutions | 85 | 100.0 | 61.2 | 32.9 | 10.6 | 17.6 | 2.4 | 36.5 | 21.2 | 12.9 | 2.4 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | |
| Group I ($20 or more) | 18 | 100.0 | 61.1 | 55.6 | 0.0 | 5.6 | 5.6 | 33.3 | 22.2 | 11.1 | .0 |
| Group II ($10 to $19) | 18 | 100.0 | 66.7 | 38.9 | 11.1 | 16.7 | .0 | 33.3 | 22.2 | 11.1 | .0 |
| Group III ($5 to $9) | 21 | 100.0 | 61.9 | 23.8 | 23.8 | 14.3 | .0 | 38.1 | 23.8 | 9.5 | 4.8 |
| Group IV (Less than $5) | 28 | 100.0 | 57.1 | 21.4 | 7.1 | 28.6 | 3.6 | 39.3 | 17.9 | 17.9 | 3.6 |
| By control: | | | | | | | | | | | |
| Public | 53 | 100.0 | 73.6 | 37.7 | 17.0 | 18.9 | 3.8 | 22.6 | 15.1 | 7.5 | .0 |
| Private | 32 | 100.0 | 40.6 | 25.0 | .0 | 15.6 | .0 | 59.4 | 31.3 | 21.9 | 6.3 |

*TABLE A–3.—Institutions reporting changes in expenditures of non-Federal funds for research and education in the sciences, by institutional fund group and control of institution, FY 1969 to FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Total institutions reporting | | Percent of institutions reporting— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Less than 10 percent | 10–25 percent | More than 25 percent | | | Less than 10 percent | 10–25 percent | More than 25 percent |
| All institutions | 85 | 100.0 | 95.3 | 47.1 | 29.4 | 18.8 | 1.2 | 3.5 | 2.4 | 0.0 | 1.2 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | |
| Group I ($20 or more) | 18 | 100.0 | 100.0 | 77.8 | 11.1 | 11.1 | .0 | .0 | .0 | .0 | .0 |
| Group II ($10 to $19) | 18 | 100.0 | 100.0 | 44.4 | 22.2 | 33.3 | .0 | .0 | .0 | .0 | .0 |
| Group III ($5 to $9) | 21 | 100.0 | 90.5 | 52.4 | 23.8 | 14.3 | .0 | 9.5 | 9.5 | .0 | .0 |
| Group IV (Less than $5) | 28 | 100.0 | 92.9 | 25.0 | 50.0 | 17.9 | 3.6 | 3.6 | .0 | .0 | 3.6 |
| By control: | | | | | | | | | | | |
| Public | 53 | 100.0 | 94.3 | 41.5 | 30.2 | 22.6 | 1.9 | 3.8 | 3.8 | .0 | .0 |
| Private | 32 | 100.0 | 96.9 | 56.3 | 28.1 | 12.5 | .0 | 3.1 | .0 | .0 | 3.1 |

*TABLE A–4.—Number of institutions with non-Federal funds compensating for reduction in Federal funds for research and education in the sciences, by institutional fund group and control of institution, FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Institutions expending less Federal funds in FY 1970 than in FY 1969 | Institutions in which the reduction in Federal funds was at least equaled by increased expenditure of non-Federal funds | |
|---|---|---|---|
| | | Number | Percent of total |
| All institutions | 31 | 18 | 58.1 |
| By institutional fund group: (Millions of dollars) | | | |
| Group I ($20 or more) | 6 | 3 | 50.0 |
| Group II ($10 to $19) | 6 | 4 | 66.7 |
| Group III ($5 to $9) | 8 | 4 | 50.0 |
| Group IV (Less than $5) | 11 | 7 | 63.6 |
| By control: | | | |
| Public | 12 | 8 | 66.7 |
| Private | 19 | 10 | 52.6 |

*TABLE A–5.—Principal sources of increase in the use of non-Federal funds for research and education in the sciences resulting from changes in Federal funding, by institutional fund group and control of institution, FY 1969 to FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Total institutions reporting | Institutions reporting increased non-Federal funds due to changes in Federal funding | | Number of institutions reporting sources of increased non-Federal funds from— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number | Percent of total | State governments | Student tuition and fees | Endowment earnings | Endowment principal | Foundations | Voluntary health agencies | Industry | Gifts from individuals | Other |
| All institutions | 86 | 42 | 48.8 | 25 | 27 | 11 | 4 | 14 | 5 | 8 | 9 | 6 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | |
| Group I ($20 or more) | 18 | 12 | 66.7 | 5 | 7 | 8 | 2 | 5 | 1 | 2 | 3 | 5 |
| Group II ($10 to $19) | 18 | 10 | 55.6 | 9 | 9 | 1 | 2 | 3 | 2 | 1 | 2 | 0 |
| Group III ($5 to $9) | 22 | 9 | 40.9 | 6 | 4 | 2 | 0 | 3 | 0 | 2 | 2 | 0 |
| Group IV (Less than $5) | 28 | 11 | 39.3 | 5 | 7 | 0 | 0 | 3 | 2 | 3 | 2 | 1 |
| By control: | | | | | | | | | | | | |
| Public | 53 | 22 | 41.5 | 22 | 13 | 1 | 1 | 6 | 4 | 1 | 3 | 1 |
| Private | 33 | 20 | 60.6 | 3 | 14 | 10 | 3 | 8 | 1 | 4 | 6 | 5 |

*TABLE A–6.—Institutions reporting reduction in operational level of major research facilities because of changes in Federal funding, by institutional fund group and control of institution, FY 1968 to FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Total institutions reporting | Institutions reporting reductions | | Total major facilities reduced | | 1970 less than half of 1968 | | 1970 one-half to three-fourths of 1968 | | 1970 three-fourths or more of 1968 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| All institutions | 86 | 21 | 24.4 | 37 | 100.0 | 9 | 24.3 | 12 | 32.4 | 16 | 43.2 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | |
| Group I ($20 or more) | 18 | 9 | 50.0 | 17 | 100.0 | 4 | 23.5 | 5 | 29.4 | 8 | 47.1 |
| Group II ($10 to $19) | 18 | 3 | 16.7 | 9 | 100.0 | 1 | 11.1 | 5 | 55.6 | 3 | 33.3 |
| Group III ($5 to $9) | 22 | 8 | 36.4 | 11 | 100.0 | 4 | 36.4 | 2 | 18.2 | 5 | 45.5 |
| Group IV (Less than $5) | 28 | *1 | 3.6 | (*) | (*) | ------ | ------ | ------ | ------ | ------ | ------ |
| By control: | | | | | | | | | | | |
| Public | 53 | 13 | 24.5 | 22 | 100.0 | 5 | 22.7 | 7 | 31.8 | 10 | 45.5 |
| Private | 33 | 8 | 24.2 | 15 | 100.0 | 4 | 26.7 | 5 | 33.3 | 6 | 40.0 |

* Number of facilities and reduction not provided by institution.

*TABLE A–7.—Departments indicated by institutions as most seriously affected because of changes in Federal funding, FY 1970*

| Department | Frequency of designation of department | Frequency of critical effects mentioned were— | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Impairment of research | Facilities or equipment curtailment | Morale factors | Career and employment impacts | Solvency and financial factors | Impairment of graduate program | Other effects |
| Total | 109 | 41 | 16 | 5 | 15 | 10 | 48 | 30 |
| Life sciences | 31 | 11 | 7 | 2 | 3 | 2 | 14 | 7 |
| Biochemistry | 5 | 2 | 0 | 0 | 0 | 0 | 2 | 0 |
| Biology | 16 | 5 | 3 | 0 | 3 | 2 | 7 | 6 |
| Microbiology | 7 | 2 | 2 | 0 | 0 | 0 | 3 | 1 |
| Pharmacology | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Physiology | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Zoology | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 |
| Physical sciences | 44 | 17 | 8 | 0 | 6 | 2 | 20 | 15 |
| Atmospheric sciences | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Chemistry | 19 | 10 | 6 | 0 | 2 | 2 | 9 | 7 |
| Physics | 21 | 6 | 1 | 0 | 4 | 0 | 10 | 6 |
| Space research | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Mathematics | 8 | 3 | 1 | 0 | 4 | 0 | 4 | 2 |
| Engineering | 10 | 5 | 0 | 1 | 1 | 0 | 4 | 3 |
| Chemical | 6 | 3 | 0 | 1 | 1 | 0 | 2 | 1 |
| Electrical | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 2 |
| Other | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Social sciences | 10 | 5 | 0 | 2 | 1 | 1 | 6 | 3 |
| Economics | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Psychology | 5 | 1 | 0 | 0 | 1 | 0 | 3 | 2 |
| Sociology | 4 | 3 | 0 | 2 | 0 | 1 | 2 | 1 |
| Computer Center | 6 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |

*TABLE A–8.—Institutions reporting changes in policy or practice toward Federal awards since FY 1968, by institutional fund group and control of institution*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Total institutions reporting | Institutions reporting changed policy or practice | | Type of changes reported (number) | | | |
|---|---|---|---|---|---|---|---|
| | | Number | Percent of total | Stricter review of requests before submittal[1] | Apply to new Federal agencies | Change in organization | Reduce or defer requests |
| All institutions | 84 | 17 | 20.2 | 8 | 5 | 4 | 3 |
| By institutional fund group: (Millions of dollars) | | | | | | | |
| Group I ($20 or more) | 18 | 6 | 33.3 | 3 | 1 | 2 | 0 |
| Group II ($10 to $19) | 17 | 3 | 17.6 | 1 | 1 | 0 | 1 |
| Group III ($5 to $9) | 22 | 6 | 27.3 | 2 | 2 | 2 | 2 |
| Group IV (Less than $5) | 27 | 2 | 7.4 | 2 | 1 | 0 | 0 |
| By control: | | | | | | | |
| Public | 52 | 7 | 13.5 | 3 | 3 | 2 | 2 |
| Private | 32 | 10 | 31.3 | 5 | 2 | 2 | 1 |

*TABLE A–9.—Institutions reporting major effects caused by changes in Federal funding, by institutional fund group and control of institution, FY 1970*

| Grouping by total Federal obligations received for academic science in FY 1969 and control | Institutions reporting major effects | Actual or imminent effects categories were [a]— | | | | | |
|---|---|---|---|---|---|---|---|
| | | Impairment of research efforts | Institutional problems | Morale factors | Solvency and financial factors | Impairment of graduate program | Other effects |
| All institutions | 57 | 15 | 25 | 9 | 10 | 28 | 31 |
| By institutional fund group: (Millions of dollars) | | | | | | | |
| Group I ($20 or more) | 14 | 7 | 6 | 3 | 2 | 7 | 12 |
| Group II ($10 to $19) | 12 | 3 | 4 | 2 | 5 | 7 | 6 |
| Group III ($5 to $9) | 18 | 4 | 8 | 3 | 0 | 10 | 12 |
| Group IV (Less than $5) | 13 | 1 | 7 | 1 | 3 | 4 | 1 |
| By control: | | | | | | | |
| Public | 38 | 9 | 19 | 7 | 6 | 20 | 22 |
| Private | 19 | 6 | 6 | 2 | 4 | 8 | 9 |

[a] These major effects cited were reported in free response to an unstructured open-ended question.

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*TABLE B–1.—Percent changes in expenditures for research and education in selected science fields, by source of funds, FY 1969 to FY 1970*

| Selected science departments, by field | Number of departments responding | All sources | Federal sources | Federal research projects | Other Federal funds | Non-Federal sources |
|---|---|---|---|---|---|---|
| Chemistry | 79 | 6.5 | 0.1 | 2.4 | −8.4 | 11.0 |
| Physics | 71 | .9 | −4.7 | −3.2 | −19.7 | 8.9 |
| Mathematics | 68 | 8.8 | 5.1 | 10.9 | −8.1 | 9.9 |
| Electrical engineering | 56 | 1.1 | −4.7 | −5.4 | 3.9 | 7.6 |
| Chemical engineering | 55 | 6.8 | −1.0 | 2.1 | −13.2 | 11.1 |
| Biochemistry | 42 | 6.3 | 5.3 | 2.7 | 16.1 | 8.0 |
| Biological sciences | 64 | 3.7 | −5.0 | −5.5 | −2.7 | 11.1 |
| Microbiology | 44 | 3.7 | −2.0 | −0.6 | −8.3 | 12.6 |
| Physiology | 28 | 8.2 | 5.3 | 7.1 | 12.3 | 12.8 |
| Sociology | 40 | 6.0 | −5.7 | −7.3 | −2.7 | 12.0 |
| Economics | 42 | 16.3 | 10.4 | 7.5 | 29.8 | 17.5 |
| Psychology | 62 | 11.9 | 10.7 | 15.5 | −1.2 | 13.0 |

Note: See appendix table D for the amount of expenditures reported by the selected departments in the sample of survey institutions in fiscal year 1970.

*TABLE B–2.—Departments reporting changes in total expenditures for research and education in the sciences, by field, FY 1969 to FY 1970*

| Selected science departments, by field | Total departments responding | | Percent of departments expending— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Under 10 percent | 10–24 percent | 25 percent or over | | | Under 10 percent | 10–24 percent | 25 percent or over |
| All selected science departments | 651 | 100.0 | 69.6 | 30.9 | 27.0 | 11.7 | 1.4 | 29.0 | 17.7 | 8.9 | 2.5 |
| Chemistry | 79 | 100.0 | 69.6 | 38.0 | 21.5 | 10.1 | .0 | 30.4 | 20.3 | 7.6 | 2.5 |
| Physics | 71 | 100.0 | 59.2 | 33.8 | 18.3 | 7.0 | 1.4 | 39.4 | 26.8 | 11.3 | 1.4 |
| Mathematics | 68 | 100.0 | 80.9 | 38.2 | 32.4 | 10.3 | 2.9 | 16.2 | 13.2 | 2.9 | .0 |
| Electrical engineering | 56 | 100.0 | 71.4 | 32.1 | 28.6 | 10.7 | .0 | 28.6 | 17.9 | 8.9 | 1.8 |
| Chemical engineering | 55 | 100.0 | 69.1 | 25.5 | 32.7 | 10.9 | 5.5 | 25.5 | 16.4 | 5.5 | 3.6 |
| Biochemistry | 42 | 100.0 | 61.9 | 26.2 | 26.2 | 9.5 | .0 | 38.1 | 21.4 | 11.9 | 4.8 |
| Biological sciences | 64 | 100.0 | 67.2 | 23.4 | 32.8 | 10.9 | .0 | 32.8 | 15.6 | 14.1 | 3.1 |
| Microbiology | 44 | 100.0 | 63.6 | 27.3 | 29.5 | 6.8 | 2.3 | 34.1 | 22.7 | 6.8 | 4.5 |
| Physiology | 28 | 100.0 | 64.3 | 17.9 | 17.9 | 28.6 | 3.6 | 32.1 | 14.3 | 17.9 | .0 |
| Sociology | 40 | 100.0 | 67.5 | 27.5 | 30.0 | 10.0 | .0 | 32.5 | 10.0 | 15.0 | 7.5 |
| Economics | 42 | 100.0 | 83.3 | 40.5 | 28.6 | 14.3 | 2.4 | 14.3 | 11.9 | .0 | 2.4 |
| Psychology | 62 | 100.0 | 74.2 | 29.0 | 25.8 | 19.4 | .0 | 25.8 | 16.1 | 9.7 | .0 |

*TABLE B–3.—Departments reporting changes in expenditures of Federal funds for research and education in the sciences, by field, FY 1969 to FY 1970*

| Selected science departments, by field | Total departments responding | | Percent of departments expending— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Under 10 percent | 10–24 percent | 25 percent or over | | | Under 10 percent | 10–24 percent | 25 percent or over |
| All selected science departments | 655 | 100.0 | 49.0 | 13.1 | 12.8 | 23.1 | 2.9 | 48.1 | 14.7 | 16.9 | 16.5 |
| Chemistry | 79 | 100.0 | 43.0 | 15.2 | 12.7 | 15.2 | .0 | 57.0 | 21.5 | 10.1 | 25.3 |
| Physics | 72 | 100.0 | 36.1 | 12.5 | 8.3 | 15.3 | 2.8 | 61.1 | 22.2 | 26.4 | 12.5 |
| Mathematics | 68 | 100.0 | 55.9 | 13.2 | 10.3 | 32.4 | 7.4 | 36.8 | 5.9 | 17.6 | 13.2 |
| Electrical engineering | 57 | 100.0 | 50.9 | 10.5 | 12.3 | 28.1 | 1.8 | 47.4 | 10.5 | 21.1 | 15.8 |
| Chemical engineering | 55 | 100.0 | 47.3 | 10.9 | 14.5 | 21.8 | 5.5 | 47.3 | 14.5 | 18.2 | 14.5 |
| Biochemistry | 42 | 100.0 | 52.4 | 19.0 | 19.0 | 14.3 | .0 | 47.6 | 14.3 | 19.0 | 14.3 |
| Biological sciences | 65 | 100.0 | 52.3 | 13.8 | 13.8 | 24.6 | .0 | 47.7 | 16.9 | 13.8 | 16.9 |
| Microbiology | 45 | 100.0 | 53.3 | 22.2 | 17.8 | 13.3 | .0 | 46.7 | 20.0 | 11.1 | 15.6 |
| Physiology | 28 | 100.0 | 53.6 | 14.3 | 10.7 | 28.6 | 3.6 | 42.9 | 14.3 | 21.4 | 7.1 |
| Sociology | 41 | 100.0 | 43.9 | 7.3 | 12.2 | 24.4 | 7.3 | 48.8 | 7.3 | 9.8 | 31.7 |
| Economics | 42 | 100.0 | 54.8 | 4.8 | 7.1 | 42.9 | 9.5 | 35.7 | 2.4 | 16.7 | 16.7 |
| Psychology | 61 | 100.0 | 52.5 | 13.1 | 16.4 | 23.0 | .0 | 47.5 | 18.0 | 18.0 | 11.5 |

*TABLE B–4.—Departments reporting changes in expenditures of Federal research grant or contract funds for science research, by field, FY 1969 to FY 1970*

| Selected science departments, by field | Total departments responding | | Percent of departments expending— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Under 10 percent | 10–24 percent | 25 percent or over | | | Under 10 percent | 10–24 percent | 25 percent or over |
| All selected science departments | 649 | 100.0 | 48.7 | 12.8 | 11.7 | 24.2 | 7.4 | 43.9 | 12.8 | 15.4 | 15.7 |
| Chemistry | 79 | 100.0 | 43.0 | 15.2 | 11.4 | 16.5 | 3.8 | 53.2 | 19.0 | 17.7 | 16.5 |
| Physics | 72 | 100.0 | 34.7 | 12.5 | 8.3 | 13.9 | 6.9 | 58.3 | 23.6 | 23.6 | 11.1 |
| Mathematics | 66 | 100.0 | 54.5 | 9.1 | 16.7 | 28.8 | 9.1 | 36.4 | 4.5 | 16.7 | 15.2 |
| Electrical engineering | 56 | 100.0 | 51.8 | 10.7 | 12.5 | 28.6 | 8.9 | 39.3 | 7.1 | 17.9 | 14.3 |
| Chemical engineering | 55 | 100.0 | 49.1 | 7.3 | 14.5 | 27.3 | 9.1 | 41.8 | 9.1 | 18.2 | 14.5 |
| Biochemistry | 42 | 100.0 | 50.0 | 28.6 | 14.3 | 7.1 | 2.4 | 47.6 | 23.8 | 11.9 | 11.9 |
| Biological sciences | 64 | 100.0 | 54.7 | 10.9 | 15.6 | 28.1 | 4.7 | 40.6 | 7.8 | 15.6 | 17.2 |
| Microbiology | 45 | 100.0 | 64.4 | 26.7 | 13.3 | 24.4 | 2.2 | 33.3 | 8.9 | 13.3 | 11.1 |
| Physiology | 27 | 100.0 | 55.6 | 18.5 | 14.8 | 22.2 | 3.7 | 40.7 | 14.8 | 14.8 | 11.1 |
| Sociology | 41 | 100.0 | 36.6 | 2.4 | 9.8 | 24.4 | 19.5 | 43.9 | 7.3 | 4.9 | 31.7 |
| Economics | 41 | 100.0 | 48.8 | 7.3 | 4.9 | 36.6 | 19.5 | 31.7 | 2.4 | 9.8 | 19.5 |
| Psychology | 61 | 100.0 | 49.2 | 9.8 | 4.9 | 34.4 | 3.3 | 47.5 | 19.7 | 11.5 | 16.4 |

*TABLE B–5.—Departments reporting changes in "other" Federal funds[a] expended for research and education in the sciences, by field, FY 1969 to FY 1970*

| Selected science departments, by field | Total departments responding | | Percent of departments expending— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Under 10 percent | 10–24 percent | 25 percent or over | | | Under 10 percent | 10–24 percent | 25 percent or over |
| All selected science departments | 649 | 100.0 | 37.1 | 6.5 | 6.6 | 24.0 | 20.8 | 42.1 | 6.0 | 10.0 | 26.0 |
| Chemistry | 79 | 100.0 | 39.2 | 7.6 | 7.6 | 24.1 | 10.1 | 50.6 | 3.8 | 7.6 | 39.2 |
| Physics | 72 | 100.0 | 30.6 | 8.3 | 5.6 | 16.7 | 25.0 | 44.4 | 5.6 | 6.9 | 31.9 |
| Mathematics | 66 | 100.0 | 31.8 | 3.0 | 4.5 | 24.2 | 28.8 | 39.4 | 4.5 | 6.1 | 28.8 |
| Electrical engineering | 56 | 100.0 | 37.5 | 1.8 | 7.1 | 28.6 | 23.2 | 39.3 | 1.8 | 12.5 | 25.0 |
| Chemical engineering | 55 | 100.0 | 25.5 | 3.6 | 7.3 | 14.5 | 30.9 | 43.6 | 9.1 | 7.3 | 27.3 |
| Biochemistry | 42 | 100.0 | 50.0 | 7.1 | 7.1 | 35.7 | 9.5 | 40.5 | 9.5 | 9.5 | 21.4 |
| Biological sciences | 64 | 100.0 | 35.9 | 3.1 | 6.3 | 26.6 | 15.6 | 48.4 | 7.8 | 9.4 | 31.3 |
| Microbiology | 44 | 100.0 | 38.6 | 15.9 | 6.8 | 15.9 | 13.6 | 47.7 | 9.1 | 13.6 | 25.0 |
| Physiology | 27 | 100.0 | 51.9 | 3.7 | 11.1 | 37.0 | 11.1 | 37.0 | 3.7 | 11.1 | 22.2 |
| Sociology | 41 | 100.0 | 36.6 | 7.3 | 7.3 | 22.0 | 26.8 | 36.6 | 7.3 | 17.1 | 12.2 |
| Economics | 41 | 100.0 | 31.7 | .0 | 2.4 | 29.3 | 43.9 | 24.4 | 2.4 | 7.3 | 14.6 |
| Psychology | 62 | 100.0 | 46.8 | 14.5 | 8.1 | 24.2 | 12.9 | 40.3 | 8.1 | 16.1 | 16.1 |

[a] Includes all Federal funds other than for research project grants or contracts (e.g., institutional grants).

*TABLE B–6.—Departments reporting changes in non-Federal funds expended for research and education in the sciences, by field, FY 1969 to FY 1970*

| Selected science departments, by field | Total departments responding | | Percent of departments expending— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | More funds in FY 1970 than in FY 1969 | | | | Same amount of funds in FY 1970 as in FY 1969 | Less funds in FY 1970 than in FY 1969 | | | |
| | | | Total expending more | Increase | | | | Total expending less | Reduction | | |
| | Number | Percent | | Under 10 percent | 10–24 percent | 25 percent or over | | | Under 10 percent | 10–24 percent | 25 percent or over |
| All selected science departments | 652 | 100.0 | 80.1 | 35.3 | 30.7 | 14.1 | 2.6 | 17.3 | 12.0 | 3.5 | 1.8 |
| Chemistry | 79 | 100.0 | 81.0 | 38.0 | 25.3 | 17.7 | 2.5 | 16.5 | 10.1 | 2.5 | 3.8 |
| Physics | 71 | 100.0 | 80.3 | 45.1 | 28.2 | 7.0 | 2.8 | 16.9 | 11.3 | 4.2 | 1.4 |
| Mathematics | 68 | 100.0 | 82.4 | 36.8 | 33.8 | 11.8 | 1.5 | 16.2 | 13.2 | 2.9 | .0 |
| Electrical engineering | 58 | 100.0 | 82.1 | 48.2 | 23.2 | 10.7 | .0 | 17.9 | 14.3 | 1.8 | 1.8 |
| Chemical engineering | 55 | 100.0 | 80.0 | 25.5 | 43.6 | 10.9 | 5.5 | 14.5 | 9.1 | 5.5 | .0 |
| Biochemistry | 43 | 100.0 | 69.8 | 27.9 | 30.2 | 11.6 | 4.7 | 25.6 | 9.3 | 14.0 | 2.3 |
| Biological sciences | 64 | 100.0 | 71.9 | 25.0 | 26.6 | 20.3 | 3.1 | 25.0 | 17.2 | 3.1 | 4.7 |
| Microbiology | 44 | 100.0 | 81.8 | 40.9 | 25.0 | 15.9 | .0 | 18.2 | 13.6 | 2.3 | 2.3 |
| Physiology | 28 | 100.0 | 78.6 | 21.4 | 39.3 | 17.9 | 10.7 | 10.7 | 7.1 | 3.6 | .0 |
| Sociology | 40 | 100.0 | 75.0 | 22.5 | 35.0 | 17.5 | .0 | 25.0 | 17.5 | 5.0 | 2.5 |
| Economics | 43 | 100.0 | 83.7 | 41.9 | 30.2 | 11.6 | 2.3 | 14.0 | 11.6 | .0 | 2.3 |
| Psychology | 61 | 100.0 | 90.2 | 37.7 | 34.4 | 18.0 | 1.6 | 8.2 | 8.2 | .0 | .0 |

*TABLE B–7.—Departments with non-Federal funds compensating for reduction in Federal funds for research and education in the sciences, by field, FY 1970*

| Selected science departments, by field | Departments expending less Federal funds in FY 1970 than in FY 1969 | Percent of departments in which the reduction in Federal funds was at least equaled by increased expenditures of non-Federal funds |
|---|---|---|
| All selected science departments | 314 | 45.5 |
| Chemistry | 45 | 48.9 |
| Physics | 43 | 37.2 |
| Mathematics | 25 | 64.0 |
| Electrical engineering | 27 | 48.1 |
| Chemical engineering | 26 | 50.0 |
| Biochemistry | 20 | 25.0 |
| Biological sciences | 31 | 45.2 |
| Microbiology | 21 | 33.3 |
| Physiology | 12 | 25.0 |
| Sociology | 20 | 45.0 |
| Economics | 15 | 73.3 |
| Psychology | 29 | 48.3 |

*TABLE B–8.—Departments reporting changes in the use of non-Federal funds because of changes in Federal funding, by field, institutional fund group, control of institution, and category of change, FY 1969 to FY 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding | Departments reporting changes | | Percent of departments using an increase of non-Federal funds for— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number | Percent | Faculty salaries | Graduate student stipends | Post-doctorate stipends | Other professional salaries | Technician salaries | Equipment | Facilities | Supplies | Other |
| All selected science departments | 658 | 200 | 30.4 | 28.5 | 44.5 | 13.0 | 13.5 | 15.5 | 43.0 | 15.5 | 42.5 | 12.0 |
| By field: | | | | | | | | | | | | |
| Chemistry | 79 | 25 | 31.6 | 20.0 | 52.0 | 24.0 | 8.0 | 8.0 | 68.0 | 36.0 | 60.0 | 8.0 |
| Physics | 72 | 25 | 34.7 | 16.0 | 32.0 | 16.0 | 12.0 | 16.0 | 40.0 | 8.0 | 28.0 | 12.0 |
| Mathematics | 67 | 9 | 13.4 | 11.1 | 44.4 | 11.1 | 11.1 | .0 | .0 | 11.1 | 22.2 | 11.1 |
| Electrical engineering | 57 | 11 | 19.3 | 45.5 | 45.5 | 9.1 | 18.2 | 18.2 | 27.3 | .0 | 18.2 | 18.2 |
| Chemical engineering | 55 | 20 | 36.4 | 20.0 | 60.0 | 10.0 | 10.0 | 15.0 | 45.0 | .0 | 50.0 | 10.0 |
| Biochemistry | 43 | 22 | 51.2 | 27.3 | 36.4 | 22.7 | 22.7 | 22.7 | 45.5 | 18.2 | 50.0 | 9.1 |
| Biological sciences | 66 | 26 | 39.4 | 26.9 | 38.5 | 11.5 | 11.5 | 26.9 | 46.2 | 26.9 | 42.3 | 19.2 |
| Microbiology | 46 | 18 | 39.1 | 44.4 | 27.8 | 5.6 | 16.7 | .0 | 22.2 | 5.6 | 38.9 | .0 |
| Physiology | 27 | 12 | 44.4 | 41.7 | 41.7 | 16.7 | 16.7 | 33.3 | 50.0 | 16.7 | 75.0 | 16.7 |
| Sociology | 40 | 12 | 30.0 | 50.0 | 66.7 | .0 | 8.3 | 8.3 | 41.7 | 8.3 | 33.3 | 16.7 |
| Economics | 43 | 3 | 7.0 | 66.7 | 100.0 | .0 | 33.3 | .0 | .0 | .0 | 33.3 | .0 |
| Psychology | 63 | 17 | 27.0 | 23.5 | 47.1 | 5.9 | 11.8 | 17.6 | 58.8 | 23.5 | 35.3 | 17.6 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | |
| Group I ($20 or more) | 190 | 70 | 36.8 | 22.9 | 34.3 | 18.6 | 12.9 | 18.6 | 42.9 | 21.4 | 41.4 | 18.6 |
| Group II ($10 to $19) | 182 | 56 | 30.8 | 32.1 | 50.0 | 10.7 | 16.1 | 14.3 | 32.1 | 8.9 | 37.5 | 8.9 |
| Group III ($5 to $9) | 165 | 51 | 30.9 | 33.3 | 47.1 | 9.8 | 7.8 | 13.7 | 45.1 | 11.8 | 45.1 | 9.8 |
| Group IV (Less than $5) | 121 | 23 | 19.0 | 26.1 | 56.5 | 8.7 | 21.7 | 13.0 | 65.2 | 21.7 | 52.2 | 4.3 |
| By control: | | | | | | | | | | | | |
| Public | 420 | 121 | 28.8 | 26.4 | 46.3 | 11.6 | 14.9 | 11.6 | 39.7 | 9.9 | 39.7 | 11.6 |
| Private | 238 | 79 | 33.2 | 31.6 | 41.8 | 15.2 | 11.4 | 21.5 | 48.1 | 24.1 | 46.8 | 12.7 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–9.—Budget categories reported by departments as reduced 25 percent or more because of changes in Federal funding, by field, institutional fund group, and control of institution, FY 1969 to FY 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding | | Percent of departments indicating reduction of 25% or more for— | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Equipment | Travel | Supplies | Publications | Salaries | | Construction | Other |
| | Number | Percent | | | | | Technician | Clerical & secretarial | | |
| All selected science departments | 662 | 100.0 | 19.9 | 16.2 | 10.6 | 10.6 | 8.8 | 6.3 | 5.0 | 3.6 |
| By field: | | | | | | | | | | |
| Chemistry | 79 | 100.0 | 20.3 | 10.1 | 8.9 | 10.1 | 1.3 | 2.5 | 2.5 | 5.1 |
| Physics | 72 | 100.0 | 26.4 | 18.1 | 8.3 | 12.5 | 6.9 | 2.8 | 6.9 | 1.4 |
| Mathematics | 68 | 100.0 | .0 | 4.4 | 2.9 | 20.6 | 1.5 | 1.5 | 2.9 | 2.9 |
| Electrical engineering | 57 | 100.0 | 5.3 | 3.5 | 7.0 | 3.5 | 7.0 | 3.5 | 1.8 | .0 |
| Chemical engineering | 55 | 100.0 | 21.8 | 12.7 | 14.5 | 9.1 | 5.5 | 1.8 | 5.5 | 9.1 |
| Biochemistry | 43 | 100.0 | 48.8 | 32.6 | 23.3 | 16.3 | 14.0 | 7.0 | 7.0 | 7.0 |
| Biological sciences | 66 | 100.0 | 30.3 | 24.2 | 16.7 | 12.1 | 24.2 | 12.1 | 15.2 | 3.0 |
| Microbiology | 46 | 100.0 | 37.0 | 50.0 | 17.4 | 13.0 | 6.5 | 6.5 | 2.2 | 4.3 |
| Physiology | 28 | 100.0 | 32.1 | 25.0 | 14.3 | 7.1 | 21.4 | 21.4 | 10.7 | 3.6 |
| Sociology | 41 | 100.0 | 12.2 | 9.8 | 12.2 | 4.9 | 14.6 | 12.2 | .0 | 2.4 |
| Economics | 43 | 100.0 | 2.3 | 9.3 | 4.7 | 7.0 | 4.7 | 7.0 | .0 | 4.7 |
| Psychology | 64 | 100.0 | 14.1 | 9.4 | 4.7 | 6.3 | 7.8 | 9.4 | 4.7 | 1.6 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | |
| Group I ($20 or more) | 192 | 100.0 | 24.5 | 19.3 | 10.4 | 12.0 | 9.4 | 7.8 | 8.9 | 5.2 |
| Group II ($10 to $19) | 182 | 100.0 | 19.2 | 17.6 | 11.0 | 7.1 | 7.1 | 5.5 | 6.0 | 4.4 |
| Group III ($5 to $9) | 166 | 100.0 | 24.1 | 16.3 | 13.3 | 15.7 | 12.0 | 7.2 | 1.8 | 3.0 |
| Group IV (Less than $5) | 122 | 100.0 | 8.2 | 9.0 | 6.6 | 6.6 | 5.7 | 4.1 | 1.6 | .8 |
| By control: | | | | | | | | | | |
| Public | 421 | 100.0 | 19.7 | 14.7 | 10.0 | 9.0 | 7.8 | 5.7 | 5.5 | 2.9 |
| Private | 241 | 100.0 | 20.3 | 18.7 | 11.6 | 13.3 | 10.4 | 7.5 | 4.1 | 5.0 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–10.—Percent changes in total number of staff, by field, institutional fund group, control of institution, and type of staff, spring 1968 to 1969 and 1969 to 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Faculty | | | | Postdoctorates | | | | Other professionals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Engaged in Federal research project | | Total | | Engaged in Federal research project | | Total | | Engaged in Federal research project | |
| | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 |
| All selected science departments | 6.5 | 3.6 | 3.7 | 0.3 | 6.6 | 3.9 | NA | 1.5 | 5.7 | 1.8 | NA | 2.6 |
| By field: | | | | | | | | | | | | |
| Chemistry | 6.0 | 4.5 | 4.4 | 1.4 | 1.5 | 5.6 | NA | 2.0 | 17.8 | 3.8 | NA | −2.8 |
| Physics | 7.9 | 2.4 | 4.7 | −1.0 | 7.7 | 1.8 | NA | −2.2 | 3.4 | −1.2 | NA | −2.5 |
| Mathematics | 5.2 | 3.2 | −.1 | −5.8 | −4.1 | 16.0 | NA | [b] | −3.5 | −11.4 | NA | [b] |
| Electrical engineering | 7.0 | 3.2 | 3.4 | −1.7 | 21.2 | 21.2 | NA | 24.2 | −1.6 | −8.2 | NA | 11.9 |
| Chemical engineering | 3.2 | 6.0 | 1.1 | 4.7 | 14.3 | −3.6 | NA | 2.3 | 12.9 | 28.1 | NA | [b] |
| Biochemistry | 5.7 | 5.5 | 3.3 | 1.5 | 4.7 | 5.0 | NA | 5.7 | −2.8 | −.4 | NA | −4.5 |
| Biological sciences | 9.4 | 3.9 | 7.7 | 2.6 | 19.0 | .8 | NA | 1.0 | 8.0 | 3.0 | NA | 2.9 |
| Microbiology | 4.6 | 1.9 | 3.4 | −3.0 | 6.1 | −1.2 | NA | −4.4 | .0 | −1.9 | NA | .5 |
| Physiology | 5.5 | 5.2 | 1.9 | 4.7 | 9.3 | −2.2 | NA | −4.1 | 4.3 | 13.8 | NA | 29.0 |
| Sociology | 6.4 | 5.0 | 6.3 | −2.5 | [b] | [b] | NA | [b] | 19.3 | 6.8 | NA | 7.1 |
| Economics | 8.3 | 4.7 | 1.4 | 6.1 | [b] | [b] | NA | [b] | 8.9 | 15.2 | NA | [b] |
| Psychology | 5.5 | 2.4 | 3.4 | 6.0 | 22.0 | −9.5 | NA | −4.9 | 11.1 | 15.1 | NA | 23.4 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | |
| Group I ($20 or more) | 3.8 | 3.5 | .6 | .9 | 3.8 | 2.6 | NA | .9 | −0.2 | .4 | NA | 2.1 |
| Group II ($10 to $19) | 7.7 | 4.0 | 6.1 | 1.9 | 10.6 | 7.0 | NA | 3.4 | 10.6 | 3.9 | NA | 1.2 |
| Group III ($5 to $9) | 8.3 | 2.2 | 7.5 | −3.0 | 10.9 | −1.8 | NA | −3.0 | 12.9 | 7.7 | NA | 9.4 |
| Group IV (Less than $5) | 7.4 | 5.5 | 3.4 | −1.3 | 1.9 | 38.5 | NA | 26.8 | 20.2 | −7.9 | NA | −9.7 |
| By control: | | | | | | | | | | | | |
| Public | NA | 3.9 | NA | .1 | NA | 3.2 | NA | −1.0 | NA | 3.2 | NA | 3.3 |
| Private | NA | 3.0 | NA | .6 | NA | 4.7 | NA | 4.2 | NA | .2 | NA | 1.8 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

[b] Base number less than 25.

NA = Not available.

Note: See appendix table C-5 for numbers of staff in each category in sampled departments in spring 1970.

*TABLE B–11.—Percent changes in number of full-time staff, by field, institutional fund group, control of institution, and type of staff, spring 1968 to 1969 and 1969 to 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Faculty | | | | Postdoctorates | | | | Other professionals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Engaged in Federal research project | | Total | | Engaged in Federal research project | | Total | | Engaged in Federal research project | |
| | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 |
| All selected science departments | 6.3 | 4.0 | 3.9 | −1.0 | 6.2 | 3.9 | NA | 1.6 | 4.4 | 3.5 | NA | 3.3 |
| By field: | | | | | | | | | | | | |
| Chemistry | 5.5 | 4.2 | 3.1 | 1.0 | 1.5 | 5.3 | NA | 1.2 | 14.9 | 3.2 | NA | −3.1 |
| Physics | 7.7 | 2.2 | 5.2 | −1.1 | 7.5 | 3.6 | NA | −1.0 | 2.9 | −1.3 | NA | −2.9 |
| Mathematics | 5.1 | 4.4 | 1.1 | −5.5 | .0 | 16.0 | NA | [b] | 1.4 | −10.8 | NA | [b] |
| Electrical engineering | 6.4 | 3.8 | 3.1 | −2.1 | 20.0 | 16.0 | NA | 24.6 | 2.0 | 5.2 | NA | 13.6 |
| Chemical engineering | 2.8 | 6.8 | 1.1 | 5.1 | 15.9 | −8.2 | NA | −2.6 | 19.2 | [b] | NA | [b] |
| Biochemistry | 4.9 | 6.4 | 2.9 | 2.6 | 2.7 | 6.8 | NA | 8.5 | −4.4 | 3.1 | NA | −1.0 |
| Biological sciences | 9.4 | 2.5 | 8.0 | .1 | 18.2 | .3 | NA | .3 | 6.6 | 3.2 | NA | 1.9 |
| Microbiology | 2.7 | 2.0 | 2.4 | −5.1 | 6.2 | .0 | NA | −3.9 | −2.1 | .5 | NA | 5.4 |
| Physiology | 4.9 | 3.2 | 1.4 | 2.1 | 6.7 | −4.6 | NA | −5.8 | 8.4 | 13.7 | NA | 25.4 |
| Sociology | 6.8 | 5.2 | 6.4 | −2.8 | −50.0 | [b] | NA | [b] | 16.1 | [b] | NA | [b] |
| Economics | 7.8 | 4.5 | 8.4 | −4.0 | 33.3 | [b] | NA | [b] | 6.0 | 9.4 | NA | [b] |
| Psychology | 6.1 | 5.3 | 3.2 | −0.6 | 25.9 | −11.1 | NA | −2.6 | 6.4 | 25.9 | NA | 17.6 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | |
| Group I ($20 or more) | 4.1 | 2.6 | 0.6 | −1.4 | 3.0 | 2.6 | NA | 1.1 | −1.0 | 1.3 | NA | 1.9 |
| Group II ($10 to $19) | 7.1 | 6.2 | 6.6 | 2.2 | 10.1 | 7.9 | NA | 2.4 | 11.1 | 9.6 | NA | 5.0 |
| Group III ($5 to $9) | 8.0 | 2.6 | 7.2 | −3.0 | 11.2 | −1.8 | NA | −1.9 | 9.1 | 7.3 | NA | 8.8 |
| Group IV (Less than $5) | 6.8 | 5.5 | 3.6 | −4.0 | 2.9 | 36.0 | NA | 24.1 | 14.6 | −15.4 | NA | −10.7 |
| By control: | | | | | | | | | | | | |
| Public | NA | 4.9 | NA | −0.6 | NA | 3.8 | NA | −1.1 | NA | 5.1 | NA | 4.8 |
| Private | NA | 2.2 | NA | −1.5 | NA | 4.1 | NA | 4.2 | NA | 1.5 | NA | 1.8 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

[b] Base number less than 25.

NA = Not available.

Note: See appendix table C–6 for numbers of staff in each category in sampled departments in spring 1970.

*TABLE B–12.—Percent changes in number of science and engineering technicians, by field, institutional fund group, and control of institution, spring 1968 to 1969 and 1969 to 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding (1970 survey) | Percent change | | | |
|---|---|---|---|---|---|
| | | 1969 to 1970 | | 1969 to 1970 | |
| | | Total | Full time | Total | Full time |
| All selected science departments | 634 | −1.5 | −1.2 | −0.5 | −2.0 |
| By field: | | | | | |
| Chemistry | 79 | 7.8 | 8.3 | −1.5 | 3.7 |
| Physics | 68 | −5.7 | −3.9 | −4.4 | −6.8 |
| Mathematics | 62 | 25.0 | .0 | −3.7 | .0 |
| Electrical engineering | 57 | −8.5 | −9.2 | −3.4 | −3.6 |
| Chemical engineering | 55 | −2.1 | 1.1 | −8.3 | −3.5 |
| Biochemistry | 42 | 8.5 | 4.2 | −.3 | −6.3 |
| Biological sciences | 62 | −2.6 | .5 | 5.1 | 5.9 |
| Microbiology | 43 | −1.2 | −1.3 | 1.5 | 1.0 |
| Physiology | 26 | −7.2 | −6.5 | 9.9 | −4.5 |
| Sociology | 39 | 80.0 | 50.0 | (b) | (b) |
| Economics | 39 | 85.7 | .0 | (b) | (b) |
| Psychology | 62 | 9.6 | 8.7 | 2.8 | −3.0 |
| By institutional fund group: | | | | | |
| (Millions of dollars) | | | | | |
| Group I ($20 or more) | 181 | −3.9 | −6.9 | −.7 | −2.8 |
| Group II ($10 to $19) | 176 | 2.6 | +7.6 | 1.7 | .4 |
| Group III ($5 to $9) | 162 | −5.1 | −4.9 | −4.9 | −5.2 |
| Group IV (Less than $5) | 115 | 6.3 | +7.6 | 6.7 | 9.4 |
| By control: | | | | | |
| Public | 400 | NA | NA | .8 | −2.0 |
| Private | 234 | NA | NA | −2.0 | −2.0 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

[b] Base number less than 25.

NA = Not available.

Note: See appendix table C–6 for number of staff in sampled departments in spring 1970.

*TABLE B–13.—Percent changes in total number of graduate students, by field, institutional fund group, control of institution, and source of support, spring 1968 to 1969 and 1969 to 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total graduate students | | Supported by Federal funds | | Engaged in Federal research project | | Supported by "Other" Federal funds | | Not supported by Federal funds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 |
| All selected science departments | −0.5 | 0.7 | −2.5 | −5.0 | −2.8 | −4.8 | −2.3 | −5.2 | 0.8 | 4.1 |
| By field: | | | | | | | | | | |
| Chemistry | −1.7 | −0.7 | −4.8 | −6.5 | −5.8 | −0.9 | −3.5 | −12.6 | 1.1 | 3.9 |
| Physics | 1.3 | −2.1 | −2.2 | −6.5 | −0.1 | −5.9 | −6.0 | −7.8 | 4.7 | 2.1 |
| Mathematics | −4.5 | −2.2 | −10.6 | −9.5 | −19.4 | 5.6 | −8.0 | −13.5 | −2.5 | .1 |
| Electrical engineering | −4.1 | 2.6 | −3.7 | −7.4 | 2.9 | −5.3 | −14.7 | −11.9 | −4.3 | 6.3 |
| Chemical engineering | 1.3 | −1.9 | −7.9 | −9.2 | −5.8 | −3.5 | −8.5 | −15.7 | 7.5 | 1.7 |
| Biochemistry | −0.1 | −3.8 | 1.9 | −6.9 | −1.7 | −17.8 | 4.2 | −0.3 | −5.9 | 4.3 |
| Biological sciences | 2.5 | 2.0 | 3.5 | .5 | −5.0 | −4.8 | 6.9 | 2.3 | −1.9 | 3.3 |
| Microbiology | 0.1 | −1.9 | .7 | −2.1 | −3.0 | −5.4 | 2.5 | −0.6 | −0.9 | −1.6 |
| Physiology | −1.2 | 3.4 | −3.7 | −2.4 | 3.4 | −11.6 | −6.0 | .0 | 2.6 | 10.2 |
| Sociology | 5.9 | 3.0 | 8.7 | −9.0 | 19.7 | −23.2 | 5.6 | −1.0 | 4.7 | 8.2 |
| Economics | −2.2 | 6.0 | −11.4 | −2.6 | 5.3 | 11.6 | −16.2 | −6.4 | −0.2 | 7.7 |
| Psychology | 3.2 | 3.7 | .7 | 1.7 | −8.2 | −2.4 | 4.1 | 3.1 | 5.6 | 5.1 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | |
| Group I ($20 or more) | −3.0 | −0.5 | −5.0 | −4.4 | −3.9 | −5.8 | −5.9 | −3.1 | −1.2 | 2.8 |
| Group II ($10 to $19) | .4 | .3 | −2.0 | −3.9 | −5.4 | −0.2 | .7 | −6.6 | 2.2 | 2.5 |
| Group III ($5 to $9) | 2.5 | 3.3 | .4 | −8.6 | .5 | −9.2 | .3 | −8.4 | 3.5 | 9.1 |
| Group IV (Less than $5) | .8 | 1.8 | 3.8 | −4.9 | 8.7 | −0.6 | 1.0 | −7.3 | −0.2 | 3.0 |
| By control: | | | | | | | | | | |
| Public | NA | .0 | NA | −6.1 | NA | −6.4 | NA | −5.9 | NA | 3.3 |
| Private | NA | 1.9 | NA | −3.2 | NA | −2.0 | NA | −4.2 | NA | 5.5 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

NA = Not available.

Note: See appendix table C–7 for number of graduate students in sampled departments in spring 1970.

*TABLE B–14.—Percent changes in number of full-time graduate students, by field, institutional fund group, control of institution, and source of support, spring 1968 to 1969 and 1969 to 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total full-time graduate students | | Supported by Federal funds | | Engaged in Federal research project | | Supported by "Other" Federal funds | | Not supported by Federal funds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 | 1968 to 1969 | 1969 to 1970 |
| All selected science departments | −0.8 | −0.4 | −2.7 | −5.1 | −3.2 | −4.9 | −2.3 | −5.3 | 0.7 | 3.4 |
| By field: | | | | | | | | | | |
| Chemistry | −2.4 | −2.7 | −4.5 | −7.1 | −5.4 | −2.0 | −3.5 | −12.6 | −0.3 | 1.2 |
| Physics | .0 | −1.9 | −2.8 | −6.1 | −1.1 | −6.0 | −6.0 | −6.6 | 3.4 | 3.4 |
| Mathematics | −5.2 | −3.2 | −9.8 | −9.8 | −21.9 | 7.1 | −6.4 | −13.9 | −3.3 | −0.4 |
| Electrical engineering | −5.6 | 2.6 | −5.1 | −7.5 | .8 | −5.7 | −14.3 | −11.7 | −4.8 | 11.9 |
| Chemical engineering | −0.1 | −0.3 | −5.6 | −9.4 | −1.3 | −3.7 | −10.1 | −15.9 | 5.9 | 7.9 |
| Biochemistry | .0 | −5.0 | 1.0 | −7.3 | −2.1 | −17.0 | 3.0 | −1.4 | −3.3 | .9 |
| Biological sciences | 2.5 | 1.1 | 3.5 | .8 | −5.9 | −4.2 | 6.8 | 2.4 | 1.9 | 2.2 |
| Microbiology | .0 | −1.2 | .9 | −1.9 | −2.5 | −5.1 | 2.4 | −0.6 | −1.5 | .0 |
| Physiology | −1.8 | 4.1 | −3.4 | −0.6 | 4.7 | −5.0 | −6.0 | .4 | .9 | 10.2 |
| Sociology | 7.2 | 4.9 | 8.7 | −7.6 | 18.4 | −20.9 | 6.5 | −0.4 | 6.5 | 11.4 |
| Economics | −2.6 | 3.8 | −11.5 | −4.6 | 3.6 | 10.1 | −15.5 | −8.1 | −0.4 | 5.8 |
| Psychology | 3.8 | −0.9 | .3 | 1.3 | −7.8 | −3.0 | 3.4 | 2.8 | 7.5 | −2.8 |
| By institutional fund group: | | | | | | | | | | |
| (Millions of dollars) | | | | | | | | | | |
| Group I ($20 or more) | −3.5 | −1.0 | −4.8 | −4.4 | −3.9 | −5.9 | −5.6 | −2.9 | −2.3 | 2.5 |
| Group II ($10 to $19) | −0.4 | .3 | −2.4 | −3.9 | −6.2 | −0.2 | .4 | −6.6 | 1.4 | 3.1 |
| Group III ($5 to $9) | 2.2 | .1 | .4 | −9.6 | .9 | −9.6 | .1 | −9.7 | 3.3 | 7.5 |
| Group IV (Less than $5) | 3.6 | −0.6 | 1.6 | −4.8 | 3.8 | −1.3 | .4 | −6.8 | 4.6 | .7 |
| By control: | | | | | | | | | | |
| Public | NA | .1 | NA | −6.0 | NA | −6.3 | NA | −5.7 | NA | 4.3 |
| Private | NA | −1.5 | NA | −3.7 | NA | −2.6 | NA | −4.6 | NA | 1.1 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

NA = Not available.

Note: See appendix table C–8 for number of full-time graduate students in sampled departments in spring 1970.

## TABLE B–15.—*Appropriateness of division of research funds between young [a] and senior staff, by field, institutional fund group, and control of institution, FY 1970*

| Selected science departments, by field, institutional fund group, [b] and control of institution | Total departments responding | | Percent of departments indicating split not appropriate | | |
|---|---|---|---|---|---|
| | Number | Percent | Inadequate funds for young staff | Inadequate funds for senior staff | Intermediate |
| All selected science departments | 640 | 100.0 | 21.7 | 1.9 | 1.3 |
| By field: | | | | | |
| Chemistry | 78 | 100.0 | 26.9 | 3.8 | .0 |
| Physics | 70 | 100.0 | 24.3 | .0 | 1.4 |
| Mathematics | 62 | 100.0 | 27.4 | .0 | 1.6 |
| Electrical engineering | 56 | 100.0 | 8.9 | 5.4 | .0 |
| Chemical engineering | 54 | 100.0 | 18.5 | 1.9 | 5.6 |
| Biochemistry | 42 | 100.0 | 38.1 | 2.4 | .0 |
| Biological sciences | 65 | 100.0 | 23.1 | 3.1 | .0 |
| Microbiology | 45 | 100.0 | 26.7 | .0 | .0 |
| Physiology | 26 | 100.0 | 23.1 | 3.8 | 3.8 |
| Sociology | 38 | 100.0 | 18.4 | .0 | 2.6 |
| Economics | 43 | 100.0 | 9.3 | 2.3 | .0 |
| Psychology | 61 | 100.0 | 14.8 | .0 | 1.6 |
| By institutional fund group: | | | | | |
| (Millions of dollars) | | | | | |
| Group I ($20 or more) | 188 | 100.0 | 24.5 | 1.1 | .5 |
| Group II ($10 to $19) | 179 | 100.0 | 20.1 | 1.7 | 1.1 |
| Group III ($5 to $9) | 160 | 100.0 | 23.1 | 2.5 | 1.9 |
| Group IV (Less than $5) | 113 | 100.0 | 17.7 | 2.7 | 1.8 |
| By control: | | | | | |
| Public | 410 | 100.0 | 17.8 | 1.5 | 1.5 |
| Private | 230 | 100.0 | 28.7 | 2.6 | .9 |

[a] Seven years or less from Ph.D.

[b] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–16.—Departments reporting changes in faculty time spent in teaching, by field, institutional fund group, and control of institution, FY 1968 to FY 1970*

| Selected science departments by field, institutional fund group,[a] and control of institution | Total departments responding | | Percent of departments reporting— | | | | |
|---|---|---|---|---|---|---|---|
| | | | Greater proportion of time in teaching in FY 1970 | | Lesser proportion of time in teaching in FY 1970 | | About same proportion of time in teaching in each year |
| | Number | Percent | Total | Due primarily to change in Federal funding | Total | Due primarily to change in Federal funding | |
| All selected science departments | 656 | 100.0 | 12.3 | 4.3 | 4.1 | 3.2 | 83.5 |
| By field: | | | | | | | |
| Chemistry | 79 | 100.0 | 6.3 | 3.8 | 1.3 | 1.3 | 92.4 |
| Physics | 72 | 100.0 | 9.7 | 4.2 | 2.8 | 2.8 | 87.5 |
| Mathematics | 67 | 100.0 | 3.0 | 3.0 | 3.0 | 3.0 | 94.0 |
| Electrical engineering | 56 | 100.0 | 19.6 | 10.7 | 3.6 | 1.8 | 76.8 |
| Chemical engineering | 54 | 100.0 | 9.3 | 5.6 | 5.6 | 5.6 | 85.2 |
| Biochemistry | 43 | 100.0 | 23.3 | 2.3 | 4.7 | 2.3 | 72.1 |
| Biological sciences | 66 | 100.0 | 15.2 | 4.5 | 3.0 | 3.0 | 81.8 |
| Microbiology | 46 | 100.0 | 17.4 | .0 | 4.3 | 4.3 | 78.3 |
| Physiology | 26 | 100.0 | 38.5 | 11.5 | .0 | .0 | 61.5 |
| Sociology | 41 | 100.0 | 4.9 | 2.4 | 14.6 | 9.8 | 80.5 |
| Economics | 43 | 100.0 | 4.7 | 2.3 | 11.6 | 7.0 | 83.7 |
| Psychology | 63 | 100.0 | 14.3 | 3.2 | .0 | .0 | 85.7 |
| By institutional fund group: (Millions of dollars) | | | | | | | |
| Group I ($20 or more) | 190 | 100.0 | 13.7 | 3.2 | 1.1 | .5 | 85.3 |
| Group II ($10 to $19) | 182 | 100.0 | 15.4 | 5.5 | 6.0 | 4.4 | 78.6 |
| Group III ($5 to $9) | 164 | 100.0 | 12.2 | 4.9 | 4.3 | 4.3 | 83.5 |
| Group IV (Less than $5) | 120 | 100.0 | 5.8 | 3.3 | 5.8 | 4.2 | 88.3 |
| By control: | | | | | | | |
| Public | 418 | 100.0 | 12.0 | 3.3 | 6.0 | 4.8 | 82.1 |
| Private | 238 | 100.0 | 13.0 | 5.9 | .8 | .4 | 86.1 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–17.—Departments reporting federally funded research projects halted in FY 1969 or FY 1970 because of changes in Federal funding, by field, institutional fund group, and control of institution*

| Selected science departments by field, institutional fund group,[a] and control of institution | Number of departments responding | Percent of departments reporting projects halted— | | Number of projects halted— | | Reactivation status of projects halted entirely— | | |
|---|---|---|---|---|---|---|---|---|
| | | Temporarily | Entirely | Temporarily | Entirely | Status A[b] | Status B[b] | Status C[b] |
| | | | | | | | Percent | |
| **All selected science departments** | 662 | 19.5 | 40.8 | 215 | 638 | 29.8 | 61.8 | 6.9 |
| **By field:** | | | | | | | | |
| Chemistry | 79 | 24.1 | 59.5 | 23 | 126 | 34.9 | 56.3 | 8.7 |
| Physics | 72 | 13.9 | 51.4 | 16 | 80 | 25.0 | 67.5 | 7.5 |
| Mathematics | 68 | 10.3 | 22.1 | 17 | 27 | 18.5 | 77.8 | .0 |
| Electrical engineering | 57 | 19.3 | 40.4 | 27 | 64 | 46.9 | 53.1 | .0 |
| Chemical engineering | 55 | 12.7 | 38.2 | 11 | 57 | 26.3 | 63.2 | 10.5 |
| Biochemistry | 43 | 32.6 | 55.8 | 18 | 58 | 15.5 | 77.6 | 6.9 |
| Biological sciences | 66 | 24.2 | 48.5 | 32 | 88 | 31.8 | 59.1 | 6.8 |
| Microbiology | 46 | 21.7 | 52.2 | 11 | 47 | 40.4 | 51.1 | 8.5 |
| Physiology | 28 | 39.3 | 46.4 | 17 | 22 | 27.3 | 68.2 | 4.5 |
| Sociology | 41 | 12.2 | 26.8 | 6 | 26 | 30.8 | 42.3 | .0 |
| Economics | 43 | 18.6 | 7.0 | 19 | 11 | .0 | 63.6 | 36.4 |
| Psychology | 64 | 17.2 | 31.3 | 18 | 32 | 18.8 | 75.0 | 16.3 |
| **By institutional fund group: (Millions of dollars)** | | | | | | | | |
| Group I ($20 or more) | 192 | 26.6 | 49.0 | 82 | 225 | 32.0 | 63.6 | 4.0 |
| Group II ($10 to $19) | 182 | 17.6 | 42.3 | 61 | 186 | 26.9 | 66.7 | 5.9 |
| Group III ($5 to $9) | 166 | 21.7 | 37.3 | 57 | 163 | 33.7 | 51.5 | 10.4 |
| Group IV (Less than $5) | 122 | 8.2 | 30.3 | 15 | 63 | 20.6 | 68.3 | 11.1 |
| **By control:** | | | | | | | | |
| Public | 421 | 18.1 | 38.7 | 124 | 383 | 30.0 | 62.4 | 7.3 |
| Private | 241 | 22.0 | 44.4 | 91 | 254 | 29.5 | 61.0 | 6.3 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

[b] Status A—Not scheduled for reactivation, regardless of Federal funding situation.

Status B—Will be reactivated if, and only if, Federal funds are received.

Status C—Will be reactivated on the basis of support from non-Federal sources.

*TABLE B–18.—Departments reporting reductions in operational level of major research facilities because of changes in Federal funding, by field, institutional fund group, and control of institution, FY 1968 to FY 1970*

| Selected science departments, by field, institutional fund group, [a] and control of institution | Total departments responding | | Departments reporting reductions | | Total major facilities reduced | | 1970 less than half of 1968 | | 1970 One-half to three-fourths of 1968 | | 1970 three-fourths or more of 1968 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| All selected science departments | 645 | 100.0 | 91 | 14.1 | 131 | 100.0 | 50 | 38.2 | 38 | 29.0 | 43 | 32.8 |
| By field: | | | | | | | | | | | | |
| Chemistry | 79 | 100.0 | 8 | 10.1 | 10 | 100.0 | 1 | 10.0 | 5 | 50.0 | 4 | 40.0 |
| Physics | 72 | 100.0 | 24 | 33.3 | 39 | 100.0 | 13 | 33.3 | 9 | 23.1 | 17 | 43.6 |
| Mathematics | 64 | 100.0 | 0 | .0 | 0 | .0 | 0 | ------ | 0 | ------ | 0 | ------ |
| Electrical engineering | 55 | 100.0 | 6 | 10.9 | 9 | 100.0 | 3 | 33.3 | 3 | 33.3 | 3 | 33.3 |
| Chemical engineering | 52 | 100.0 | 9 | 17.3 | 16 | 100.0 | 8 | 50.0 | 7 | 43.8 | 1 | 6.3 |
| Biochemistry | 42 | 100.0 | 5 | 11.9 | 6 | 100.0 | 3 | 50.0 | 0 | .0 | 3 | 50.0 |
| Biological sciences | 64 | 100.0 | 13 | 20.3 | 16 | 100.0 | 4 | 25.0 | 5 | 31.3 | 7 | 43.8 |
| Microbiology | 46 | 100.0 | 17 | 15.2 | 10 | 100.0 | 6 | 60.0 | 3 | 30.0 | 1 | 10.0 |
| Physiology | 27 | 100.0 | 7 | 25.9 | 11 | 100.0 | 4 | 36.4 | 2 | 18.2 | 5 | 45.5 |
| Sociology | 40 | 100.0 | 5 | 12.5 | 7 | 100.0 | 2 | 28.6 | 3 | 42.9 | 2 | 28.6 |
| Economics | 40 | 100.0 | 1 | 2.5 | 1 | 100.0 | 0 | .0 | 1 | 100.0 | 0 | .0 |
| Psychology | 64 | 100.0 | 6 | 9.4 | 6 | 100.0 | 6 | 100.0 | 0 | .0 | 0 | .0 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | |
| Group I ($20 or more) | 181 | 100.0 | 36 | 19.9 | 55 | 100.0 | 16 | 29.1 | 18 | 32.7 | 21 | 38.2 |
| Group II ($10 to $19) | 177 | 100.0 | 25 | 14.1 | 35 | 100.0 | 13 | 37.1 | 10 | 28.6 | 12 | 34.3 |
| Group III ($5 to $9) | 165 | 100.0 | 22 | 13.3 | 34 | 100.0 | 17 | 50.0 | 7 | 20.6 | 10 | 29.4 |
| Group IV (Less than $5) | 122 | 100.0 | 8 | 6.6 | 7 | 100.0 | 4 | 57.1 | 3 | 42.9 | 0 | .0 |
| By control: | | | | | | | | | | | | |
| Public | 413 | 100.0 | 57 | 13.8 | 79 | 100.0 | 28 | 35.4 | 23 | 29.1 | 28 | 35.4 |
| Private | 232 | 100.0 | 34 | 14.7 | 52 | 100.0 | 22 | 42.3 | 15 | 28.8 | 15 | 28.8 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–19.—Changes in departmental policy or practice toward Federal awards, by field, institutional fund group, control of institution, and type of change, FY 1970*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding | | Departments reporting changed policy or practice | | Type of changes reported (Number)[b] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | A | B | C | D | E | F | G | H | All other |
| All selected science departments | 659 | 100.0 | 94 | 14.3 | 23 | 18 | 12 | 11 | 10 | 9 | 7 | 5 | 22 |
| By field: | | | | | | | | | | | | | |
| Chemistry | 79 | 100.0 | 10 | 12.7 | 1 | 3 | 1 | 2 | 0 | 1 | 2 | 0 | 4 |
| Physics | 72 | 100.0 | 10 | 13.9 | 4 | 0 | 2 | 1 | 2 | 1 | 1 | 0 | 0 |
| Mathematics | 67 | 100.0 | 7 | 10.4 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Electrical engineering | 57 | 100.0 | 6 | 10.5 | 0 | 3 | 0 | 1 | 2 | 1 | 1 | 0 | 0 |
| Chemical engineering | 55 | 100.0 | 10 | 18.2 | 1 | 2 | 3 | 1 | 0 | 2 | 1 | 0 | 2 |
| Biochemistry | 43 | 100.0 | 4 | 9.3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| Biological sciences | 66 | 100.0 | 9 | 13.6 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 3 |
| Microbiology | 46 | 100.0 | 9 | 19.6 | 3 | 1 | 3 | 0 | 0 | 1 | 0 | 2 | 3 |
| Physiology | 27 | 100.0 | 2 | 7.4 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Sociology | 41 | 100.0 | 6 | 14.6 | 5 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 |
| Economics | 43 | 100.0 | 6 | 14.0 | 0 | 2 | 0 | 0 | 3 | 1 | 0 | 0 | 2 |
| Psychology | 63 | 100.0 | 15 | 23.8 | 5 | 2 | 1 | 2 | 2 | 0 | 2 | 0 | 4 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | | |
| Group I ($20 or more) | 190 | 100.0 | 26 | 13.7 | 2 | 3 | 4 | 5 | 4 | 4 | 3 | 2 | 7 |
| Group II ($10 to $19) | 182 | 100.0 | 22 | 12.1 | 9 | 6 | 3 | 1 | 0 | 2 | 2 | 2 | 3 |
| Group III ($5 to $9) | 166 | 100.0 | 22 | 13.3 | 6 | 5 | 3 | 1 | 2 | 2 | 1 | 0 | 3 |
| Group IV (Less than $5) | 121 | 100.0 | 24 | 19.8 | 6 | 4 | 2 | 4 | 4 | 1 | 1 | 1 | 9 |
| By control: | | | | | | | | | | | | | |
| Public | 420 | 100.0 | 63 | 15.0 | 19 | 13 | 9 | 5 | 4 | 4 | 5 | 3 | 16 |
| Private | 239 | 100.0 | 31 | 13.0 | 4 | 5 | 3 | 6 | 6 | 5 | 2 | 2 | 6 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

[b] Types of changes reported:

A. Reduce number of proposals.
B. Submit more proposals.
C. Shift in emphasis of research (such as environmental problems).
D. Stricter review of requests before submitting.
E. No longer apply to certain agencies.
F. Shift to new Federal agencies to ask for support.
G. Submit proposals to more agencies.
H. Less likely to apply for nonresearch funds.

*TABLE B–20.—Effect of changes in Federal funding on policies of admitting new graduate students, by field, institutional fund group, control of institution, and type of change*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding | | Percent of departments reporting changes— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Resulting "wholly" from Federal funding | Resulting "in part" from Federal funding | By type | | | | | |
| | Number | Percent | | | | Reduce programs | Raise standards | Reduce support per student | Reduce foreign students | Use new source of funds | Other |
| All selected science departments | 659 | 100.0 | 32.0 | 8.5 | 23.5 | 22.9 | 5.5 | 3.0 | 3.2 | 1.2 | 8.5 |
| By field: | | | | | | | | | | | |
| Chemistry | 79 | 100.0 | 29.1 | 6.3 | 22.8 | 20.3 | 2.5 | 2.5 | 3.8 | 2.5 | 13.9 |
| Physics | 72 | 100.0 | 50.0 | 12.5 | 37.5 | 34.7 | 12.5 | 2.8 | 6.9 | .0 | 8.3 |
| Mathematics | 67 | 100.0 | 13.5 | 4.5 | 9.0 | 10.4 | 1.5 | .0 | 1.5 | 1.5 | 6.0 |
| Electrical engineering | 57 | 100.0 | 15.8 | 3.5 | 12.3 | 10.5 | .0 | 1.8 | 7.0 | 1.8 | 3.5 |
| Chemical engineering | 55 | 100.0 | 31.0 | 5.5 | 25.5 | 20.0 | 3.6 | 1.8 | 10.9 | .0 | 7.3 |
| Biochemistry | 43 | 100.0 | 48.9 | 25.6 | 23.3 | 32.6 | 9.3 | 4.7 | 2.3 | 4.7 | 11.6 |
| Biological sciences | 66 | 100.0 | 33.4 | 7.6 | 25.8 | 27.3 | 3.0 | 4.5 | 1.5 | 1.5 | 7.6 |
| Microbiology | 46 | 100.0 | 39.1 | 13.0 | 26.1 | 28.3 | 19.6 | 2.2 | .0 | .0 | 8.7 |
| Physiology | 27 | 100.0 | 29.6 | 11.1 | 18.5 | 25.9 | 7.4 | .0 | .0 | .0 | 7.4 |
| Sociology | 41 | 100.0 | 36.6 | 4.9 | 31.7 | 22.0 | 9.8 | 2.4 | .0 | .0 | 14.7 |
| Economics | 42 | 100.0 | 14.3 | 4.8 | 9.5 | 9.5 | 2.4 | 4.8 | .0 | .0 | 4.8 |
| Psychology | 64 | 100.0 | 42.2 | 7.8 | 34.4 | 32.8 | .0 | 7.8 | .0 | 1.6 | 7.8 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | |
| Group I ($20 or more) | 190 | 100.0 | 37.9 | 11.6 | 26.3 | 28.9 | 2.6 | 3.2 | 3.7 | 2.1 | 10.0 |
| Group II ($10 to $19) | 182 | 100.0 | 37.3 | 10.4 | 26.9 | 26.4 | 8.8 | 2.2 | 3.3 | .5 | 8.8 |
| Group III ($5 to $9) | 166 | 100.0 | 25.9 | 4.2 | 21.7 | 19.3 | 5.4 | 3.0 | 3.0 | 1.8 | 7.8 |
| Group IV (Less than $5) | 121 | 100.0 | 23.1 | 6.6 | 16.5 | 13.2 | 5.0 | 4.1 | 2.5 | .0 | 6.6 |
| By control: | | | | | | | | | | | |
| Public | 421 | 100.0 | 28.0 | 5.9 | 22.1 | 19.5 | 6.9 | 2.6 | 2.6 | .7 | 8.1 |
| Private | 238 | 100.0 | 39.1 | 13.0 | 26.1 | 29.0 | 2.9 | 3.8 | 4.2 | 2.1 | 9.2 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–21.—Effect of changes in Federal funding on policies of accepting new postdoctorates, by field, institutional fund group, control of institution, and type of change*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding | | Percent of departments reporting changes— | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Resulting "wholly" from Federal funding | Resulting "in part" from Federal funding | By type | | | | |
| | Number | Percent | | | | Reduce programs | Increase programs | Raise standards | Reduce support per postdoctorates | Other |
| All selected science departments | 627 | 100.0 | 14.5 | 10.2 | 4.3 | 11.3 | 1.3 | 1.0 | .8 | 3.9 |
| By field: | | | | | | | | | | |
| Chemistry | 79 | 100.0 | 19.0 | 16.5 | 2.5 | 16.5 | .0 | .0 | .0 | 10.2 |
| Physics | 71 | 100.0 | 29.6 | 18.3 | 11.3 | 21.1 | 4.2 | 1.4 | .0 | 7.0 |
| Mathematics | 62 | 100.0 | 8.0 | 4.8 | 3.2 | 3.2 | 4.8 | .0 | .0 | 3.2 |
| Electrical engineering | 52 | 100.0 | 9.6 | 5.8 | 3.8 | 7.7 | .0 | 1.9 | .0 | 3.8 |
| Chemical engineering | 54 | 100.0 | 14.9 | 5.6 | 9.3 | 11.1 | .0 | .0 | 1.9 | 1.9 |
| Biochemistry | 42 | 100.0 | 19.1 | 14.3 | 4.8 | 19.0 | .0 | .0 | 2.4 | .0 |
| Biological sciences | 64 | 100.0 | 21.9 | 20.3 | 1.6 | 17.2 | 1.6 | 4.7 | .0 | 4.7 |
| Microbiology | 45 | 100.0 | 15.6 | 8.9 | 6.7 | 15.6 | .0 | .0 | .0 | 4.4 |
| Physiology | 25 | 100.0 | 16.0 | 12.0 | 4.0 | 8.0 | .0 | 4.0 | 4.0 | 4.0 |
| Sociology | 32 | 100.0 | 6.2 | 3.1 | 3.1 | 3.1 | .0 | .0 | 6.3 | .0 |
| Economics | 39 | 100.0 | .0 | .0 | .0 | .0 | 2.6 | .0 | .0 | .0 |
| Psychology | 62 | 100.0 | 3.2 | 3.2 | .0 | 3.2 | .0 | .0 | .0 | .0 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | |
| Group I ($20 or more) | 186 | 100.0 | 24.7 | 17.7 | 7.0 | 22.6 | .0 | .5 | 2.2 | 3.7 |
| Group II ($10 to $19) | 167 | 100.0 | 13.8 | 9.6 | 4.2 | 7.2 | 3.0 | 2.4 | .6 | 3.6 |
| Group III ($5 to $9) | 157 | 100.0 | 10.8 | 7.6 | 3.2 | 8.3 | .6 | .6 | .0 | 5.1 |
| Group IV (Less than $5) | 117 | 100.0 | 4.3 | 2.6 | 1.7 | 3.4 | 1.7 | .0 | .0 | 2.6 |
| By control: | | | | | | | | | | |
| Public | 396 | 100.0 | 12.1 | 8.1 | 4.0 | 7.8 | 1.8 | 1.3 | .3 | 4.3 |
| Private | 231 | 100.0 | 18.7 | 13.9 | 4.8 | 17.3 | .4 | .4 | 1.7 | 2.6 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

*TABLE B–22.—Other major effects reported because of changes in Federal funding, by field, institutional fund group, and control of institution*

| Selected science departments, by field, institutional fund group,[a] and control of institution | Total departments responding | | Percent of departments reporting "other" actual or imminent effects | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Impairment of research | Impairment of graduate programs | Institutional problems | Morale factors | Career employment impacts | Solvency and financial factors | New investigators hurt | Postdoctorate programs impaired | Reduction of equipment, construction, or supplies | Major impact next year |
| All selected science departments | 662 | 100.0 | 16.9 | 27.0 | 8.9 | 4.7 | 5.0 | 4.8 | 5.1 | 5.9 | 4.7 | 5.7 |
| By field: | | | | | | | | | | | | |
| Chemistry | 79 | 100.0 | 13.9 | 26.6 | 12.7 | 5.1 | 2.5 | 16.5 | 10.1 | 16.5 | 6.3 | 6.3 |
| Physics | 72 | 100.0 | 19.4 | 33.3 | 11.1 | 6.9 | 13.9 | 5.6 | 6.9 | 9.7 | 4.2 | 8.3 |
| Mathematics | 68 | 100.0 | 8.8 | 25.0 | 2.9 | .0 | 2.9 | .0 | 7.4 | 1.5 | .0 | 1.5 |
| Electrical engineering | 57 | 100.0 | 17.5 | 21.1 | 12.3 | .0 | 1.8 | 3.5 | 1.8 | .0 | 1.8 | 8.8 |
| Chemical engineering | 55 | 100.0 | 25.5 | 14.5 | 5.5 | 3.6 | 3.6 | 5.5 | 7.3 | 1.8 | 3.6 | 1.8 |
| Biochemistry | 43 | 100.0 | 18.6 | 41.9 | 9.3 | 4.7 | 7.0 | 11.6 | 7.0 | 4.7 | 14.0 | 4.7 |
| Biological sciences | 66 | 100.0 | 19.7 | 25.8 | 4.5 | 3.0 | 6.1 | 1.5 | 4.5 | 6.1 | 9.1 | 1.5 |
| Microbiology | 46 | 100.0 | 10.9 | 37.0 | 10.9 | 10.9 | 8.7 | 4.3 | 6.5 | 15.2 | 2.2 | 10.9 |
| Physiology | 28 | 100.0 | 28.6 | 17.9 | 17.9 | 7.1 | 3.6 | .0 | .0 | 10.7 | 7.1 | 7.1 |
| Sociology | 41 | 100.0 | 34.1 | 36.6 | 7.3 | 9.8 | 2.4 | 2.4 | .0 | .0 | 2.4 | 9.8 |
| Economics | 43 | 100.0 | 4.7 | 14.0 | 4.7 | .0 | .0 | .0 | 2.3 | .0 | 2.3 | 2.3 |
| Psychology | 64 | 100.0 | 10.9 | 29.7 | 10.9 | 7.8 | 4.7 | 1.6 | 1.6 | 1.6 | 4.7 | 7.8 |
| By institutional fund group: (Millions of dollars) | | | | | | | | | | | | |
| Group I ($20 or more) | 192 | 100.0 | 17.7 | 27.1 | 9.9 | 4.2 | 3.1 | 5.7 | 7.3 | 8.3 | 6.8 | 8.3 |
| Group II ($10 to $19) | 182 | 100.0 | 22.5 | 28.6 | 12.6 | 6.0 | 9.9 | 6.0 | 6.0 | 6.0 | 2.7 | 5.5 |
| Group III ($5 to $9) | 166 | 100.0 | 10.8 | 28.3 | 6.6 | 5.4 | 3.6 | 3.0 | 2.4 | 4.2 | 3.6 | 4.2 |
| Group IV (Less than $5) | 122 | 100.0 | 15.6 | 23.0 | 4.9 | 2.5 | 2.5 | 4.1 | 4.1 | 4.1 | 5.7 | 4.1 |
| By control: | | | | | | | | | | | | |
| Public | 421 | 100.0 | 17.6 | 27.8 | 9.5 | 4.0 | 5.9 | 4.3 | 4.8 | 5.0 | 3.6 | 6.4 |
| Private | 241 | 100.0 | 15.8 | 25.7 | 7.9 | 5.8 | 3.3 | 5.8 | 5.8 | 7.5 | 6.6 | 4.6 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

# APPENDIX C

# Basic Data


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*TABLE C–1.—Expenditures for research and education in the sciences of funds from all sources, by institutional fund group and control of institution, FY 1969 and FY 1970*

(Totals for sample reporting institutions)

(Thousands of dollars)

| Grouping by total Federal obligations received for academic science in FY 1969 | Total institutions | | Public institutions | | Private institutions | |
|---|---|---|---|---|---|---|
| | Amount reported | | Amount reported | | Amount reported | |
| | FY 1969 | FY 1970 | FY 1969 | FY 1970 | FY 1969 | FY 1970 |
| All institutions (53 public 32 private) | $1,409,561 | $1,529,698 | $914,753 | $1,014,805 | $494,808 | $514,893 |
| (Millions of dollars) | | | | | | |
| Group I ($20 or more) (8 public 10 private) | 643,596 | 671,101 | 300,411 | 314,565 | 343,185 | 356,536 |
| Group II ($10 to $19) (16 public 2 private) | 367,192 | 421,086 | 341,055 | 394,650 | 26,137 | 26,436 |
| Group III ($5 to $9) (13 public 8 private) | 224,186 | 241,805 | 142,715 | 153,518 | 81,471 | 88,287 |
| Group IV (Less than $5) (16 public 12 private) | 174,587 | 195,706 | 130,572 | 152,072 | 44,015 | 43,634 |

*TABLE C–2.—Expenditures for research and education in the sciences of funds from Federal sources, by institutional fund group and control of institution, FY 1969 and FY 1970*

(Totals for sample reporting institutions)

(Thousands of dollars)

| Grouping by total Federal obligations received for academic science in FY 1969 | Total institutions | | Public institutions | | Private institutions | |
|---|---|---|---|---|---|---|
| | Amount reported | | Amount reported | | Amount reported | |
| | FY 1969 | FY 1970 | FY 1969 | FY 1970 | FY 1969 | FY 1970 |
| All institutions (53 public 32 private) | $576,468 | $590,152 | $312,505 | $329,912 | $263,963 | $260,240 |
| (Millions of dollars) | | | | | | |
| Group I ($20 or more) (8 public 10 private) | 340,189 | 340,204 | 128,852 | 132,181 | 211,337 | 208,023 |
| Group II ($10 to $19) (16 public 2 private) | 130,664 | 137,511 | 117,342 | 124,851 | 13,322 | 12,660 |
| Group III ($5 to $9) (13 public 8 private) | 69,365 | 73,263 | 43,534 | 46,233 | 25,831 | 27,030 |
| Group IV (Less than $5) (16 public 12 private) | 36,250 | 39,174 | 22,777 | 26,647 | 13,473 | 12,527 |

*TABLE C–3.—Expenditures for research and education in the sciences of funds from non-Federal sources, by institutional fund group and control of institution, FY 1969 and FY 1970*

(Totals for sample reporting institutions)

(Thousands of dollars)

| Grouping by total Federal obligations received for academic science in FY 1969 | Total institutions | | Public institutions | | Private institutions | |
|---|---|---|---|---|---|---|
| | Amount reported | | Amount reported | | Amount reported | |
| | FY 1969 | FY 1970 | FY 1969 | FY 1970 | FY 1969 | FY 1970 |
| All institutions (53 public 32 private) | $833,090 | $939,535 | $602,242 | $684,714 | $230,848 | $254,821 |
| (Millions of dollars) | | | | | | |
| Group I ($20 or more) (8 public 10 private) | 303,405 | 330,897 | 171,558 | 182,384 | 131,847 | 148,513 |
| Group II ($10 to $19) (16 public 2 private) | 236,528 | 283,743 | 223,712 | 269,802 | 12,816 | 13,941 |
| Group III ($5 to $9) (13 public 8 private) | 154,820 | 168,542 | 99,179 | 107,284 | 55,641 | 61,258 |
| Group IV (Less than $5) (16 public 12 private) | 138,337 | 156,353 | 107,793 | 125,244 | 30,544 | 31,109 |

## TABLE C–4.—*Expenditures for research and education in selected science fields, by institutional fund group, control, and source of funds, FY 1970*

(Totals for sample reporting departments)

(Millions of Dollars)

| Selected science departments, by field, institutional fund group,[a] and control of institution | All sources | | Federal sources | | | Non-Federal sources |
|---|---|---|---|---|---|---|
| | Amount | Number of[b] departments responding | Total Federal | Federal research projects | Other Federal funds | |
| All selected science departments | $644 | 651 | $281 | $235 | $45 | $365 |
| By field: | | | | | | |
| Chemistry | 120 | 79 | 47 | 37 | 9 | 73 |
| Physics | 123 | 71 | 69 | 63 | 5 | 55 |
| Mathematics | 66 | 68 | 15 | 11 | 4 | 51 |
| Electrical engineering | 65 | 56 | 32 | 30 | 2 | 33 |
| Chemical engineering | 26 | 55 | 9 | 7 | 1 | 18 |
| Biochemistry | 29 | 42 | 18 | 15 | 4 | 11 |
| Biological sciences | 70 | 64 | 30 | 24 | 5 | 41 |
| Microbiology | 27 | 44 | 16 | 13 | 2 | 12 |
| Physiology | 18 | 28 | 11 | 8 | 1 | 7 |
| Sociology | 21 | 40 | 6 | 4 | 2 | 15 |
| Economics | 23 | 42 | 4 | 3 | 1 | 20 |
| Psychology | 56 | 62 | 25 | 19 | 7 | 30 |
| By institutional fund group: | | | | | | |
| (Millions of dollars) | | | | | | |
| Group I ($20 or more) | 328 | 192 | 173 | 151 | 21 | 155 |
| Group II ($10 to $19) | 147 | 178 | 53 | 43 | 10 | 94 |
| Group III ($5 to $9) | 102 | 163 | 39 | 30 | 9 | 64 |
| Group IV (Less than $5) | 67 | 118 | 16 | 10 | 5 | 52 |
| By control: | | | | | | |
| Public | 391 | 412 | 150 | 123 | 26 | 242 |
| Private | 253 | 239 | 131 | 112 | 19 | 122 |

[a] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

[b] The number of departments reporting funds from the various sources may differ from the number shown for all sources.

## TABLE C–5.—Total number of staff in sampled science departments, by field, institutional fund group, control of institution, and staff category, spring 1970

(Totals for sample reporting departments)

| Selected science departments, by field, institutional fund group,* and control of institution | Faculty | | Postdoctorates | | Other professionals | | Technicians |
|---|---|---|---|---|---|---|---|
| | Total | Engaged in Federal research project | Total | Engaged in Federal research project | Total | Engaged in Federal research project | |
| **All selected science departments** | 15,966 | 6,801 | 3,016 | 2,474 | 2,148 | 1,442 | 3,639 |
| **By field:** | | | | | | | |
| Chemistry | 1,939 | 853 | 1,163 | 970 | 249 | 138 | 464 |
| Physics | 2,175 | 1,347 | 551 | 496 | 318 | 276 | 935 |
| Mathematics | 2,660 | 752 | 58 | 22 | 70 | 8 | 26 |
| Electrical engineering | 1,624 | 709 | 103 | 82 | 179 | 75 | 432 |
| Chemical engineering | 737 | 315 | 53 | 45 | 41 | 19 | 144 |
| Biochemistry | 609 | 470 | 338 | 297 | 260 | 212 | 301 |
| Biological sciences | 1,688 | 838 | 395 | 295 | 411 | 315 | 603 |
| Microbiology | 542 | 393 | 171 | 151 | 253 | 200 | 347 |
| Physiology | 366 | 265 | 88 | 70 | 99 | 80 | 234 |
| Sociology | 796 | 156 | 21 | 4 | 47 | 30 | 5 |
| Economics | 1,043 | 121 | 9 | 3 | 38 | 10 | 0 |
| Psychology | 1,787 | 582 | 67 | 39 | 183 | 79 | 148 |
| **By institutional fund group:** | | | | | | | |
| (Millions of dollars) | | | | | | | |
| Group I ($20 or more) | 6,100 | 3,507 | 1,989 | 1,654 | 1,278 | 871 | 2,204 |
| Group II ($10 to $19) | 4,528 | 1,659 | 594 | 490 | 506 | 333 | 716 |
| Group III ($5 to $9) | 3,205 | 1,182 | 325 | 259 | 294 | 210 | 529 |
| Group IV (Less than $5) | 2,133 | 453 | 108 | 71 | 70 | 28 | 190 |
| **By control:** | | | | | | | |
| Public | 10,745 | 3,986 | 1,525 | 1,227 | 1,191 | 774 | 1,954 |
| Private | 5,221 | 2,815 | 1,491 | 1,247 | 957 | 668 | 1,685 |

* Grouped by total Federal obligations received for academic science in institutions, FY 1969.

## TABLE C–6.—*Number of full-time staff in sampled science departments, by field, institutional fund group, control of institution, and staff category, spring 1970*

(Totals for sample reporting departments)

| Selected science departments, by field, institutional fund group,* and control of institution | Faculty | | Postdoctorates | | Other professionals | | Technicians |
|---|---|---|---|---|---|---|---|
| | Total | Engaged in Federal research project | Total | Engaged in Federal research project | Total | Engaged in Federal research project | |
| **All selected science departments** | 14,163 | 6,260 | 2,949 | 2,424 | 1,793 | 1,301 | 3,038 |
| **By field:** | | | | | | | |
| Chemistry | 1,817 | 824 | 1,144 | 951 | 227 | 123 | 363 |
| Physics | 2,022 | 1,290 | 546 | 491 | 312 | 271 | 871 |
| Mathematics | 2,467 | 736 | 58 | 22 | 66 | 8 | 0 |
| Electrical engineering | 1,462 | 648 | 94 | 81 | 102 | 75 | 371 |
| Chemical engineering | 658 | 307 | 45 | 38 | 26 | 18 | 109 |
| Biochemistry | 496 | 391 | 331 | 294 | 234 | 190 | 236 |
| Biological sciences | 1,527 | 796 | 391 | 292 | 354 | 273 | 521 |
| Microbiology | 453 | 337 | 167 | 147 | 221 | 177 | 299 |
| Physiology | 287 | 197 | 83 | 65 | 83 | 74 | 169 |
| Sociology | 686 | 138 | 18 | 3 | 26 | 24 | 3 |
| Economics | 877 | 95 | 8 | 2 | 35 | 8 | 0 |
| Psychology | 1,411 | 501 | 64 | 38 | 107 | 60 | 96 |
| **By institutional fund group:** (Millions of dollars) | | | | | | | |
| Group I ($20 or more) | 5,360 | 3,215 | 1,949 | 1,627 | 1,051 | 785 | 1,847 |
| Group II ($10 to $19) | 4,009 | 1,517 | 577 | 472 | 445 | 294 | 565 |
| Group III ($5 to $9) | 2,928 | 1,118 | 321 | 258 | 250 | 197 | 452 |
| Group IV (Less than $5) | 1,866 | 410 | 102 | 67 | 47 | 25 | 174 |
| **By control:** | | | | | | | |
| Public | 9,662 | 3,686 | 1,481 | 1,185 | 1,002 | 674 | 1,541 |
| Private | 4,501 | 2,574 | 1,468 | 1,239 | 791 | 627 | 1,497 |

* Grouped by total Federal obligations received for academic science in institutions, FY 1969.

## TABLE C–7.—Total number of graduate students in sampled science departments, by field, institutional fund group, control of institution, and source of support, spring 1970

(Totals for sample reporting departments)[a]

| Selected science departments, by field, institutional fund group,[b] and control of institution | Total graduate students | Supported by Federal funds | Engaged in Federal research project | Supported by "other" Federal funds | Students not supported by Federal funds |
|---|---|---|---|---|---|
| All selected science departments | 49,484 | 17,248 | 7,821 | 9,444 | 32,072 |
| By field: | | | | | |
| Chemistry | 6,947 | 2,862 | 1,574 | 1,288 | 4,085 |
| Physics | 6,209 | 3,001 | 2,098 | 908 | 3,151 |
| Mathematics | 5,997 | 1,323 | 323 | 1,000 | 4,674 |
| Electrical engineering | 7,928 | 1,900 | 1,339 | 561 | 6,003 |
| Chemical engineering | 2,904 | 879 | 497 | 382 | 2,025 |
| Biochemistry | 1,286 | 900 | 300 | 600 | 386 |
| Biological sciences | 4,467 | 1,599 | 461 | 1,147 | 2,818 |
| Microbiology | 1,219 | 714 | 209 | 505 | 505 |
| Physiology | 636 | 320 | 61 | 259 | 313 |
| Sociology | 2,646 | 697 | 212 | 485 | 1,988 |
| Economics | 3,290 | 489 | 125 | 367 | 2,748 |
| Psychology | 5,955 | 2,564 | 622 | 1,942 | 3,376 |
| By institutional fund group: | | | | | |
| (Millions of dollars) | | | | | |
| Group I ($20 or more) | 21,570 | 9,449 | 4,524 | 4,925 | 12,121 |
| Group II ($10 to $19) | 12,211 | 3,980 | 1,757 | 2,223 | 8,206 |
| Group III ($5 to $9) | 9,579 | 2,590 | 1,067 | 1,532 | 6,841 |
| Group IV (Less than $5) | 6,124 | 1,229 | 473 | 764 | 4,904 |
| By control: | | | | | |
| Public | 31,701 | 10,437 | 4,875 | 5,567 | 21,167 |
| Private | 17,783 | 6,811 | 2,946 | 3,877 | 10,905 |

[a] The number of departments reporting students supported from the various sources may differ from the number of departments reporting total graduate students.

[b] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

## *TABLE C–8.—Number of full-time graduate students in sampled science departments, by field, institutional fund group, control of institution, and source of support, spring 1970*

(Totals for sample reporting departments)[a]

| Selected science departments, by field, institutional fund group,[b] and control of institution | Total full-time graduate students | Supported by Federal funds | Engaged in Federal research project | Supported by "other" Federal funds | Students not supported by Federal funds |
|---|---|---|---|---|---|
| All selected science departments | 40,500 | 17,019 | 7,688 | 9,348 | 23,385 |
| By field: | | | | | |
| Chemistry | 6,349 | 2,830 | 1,545 | 1,285 | 3,519 |
| Physics | 5,453 | 2,984 | 2,086 | 903 | 2,417 |
| Mathematics | 4,739 | 1,291 | 300 | 991 | 3,448 |
| Electrical engineering | 4,421 | 1,878 | 1,319 | 559 | 2,520 |
| Chemical engineering | 2,040 | 873 | 493 | 380 | 1,167 |
| Biochemistry | 1,223 | 868 | 292 | 576 | 355 |
| Biological sciences | 4,265 | 1,599 | 459 | 1,149 | 2,647 |
| Microbiology | 1,156 | 710 | 205 | 505 | 446 |
| Physiology | 589 | 315 | 57 | 258 | 271 |
| Sociology | 2,282 | 693 | 208 | 485 | 1,628 |
| Economics | 2,804 | 459 | 109 | 353 | 2,331 |
| Psychology | 5,179 | 2,519 | 615 | 1,904 | 2,636 |
| By institutional fund group: | | | | | |
| (Millions of dollars) | | | | | |
| Group I ($20 or more) | 18,892 | 9,380 | 4,476 | 4,904 | 9,524 |
| Group II ($10 to $19) | 10,485 | 3,927 | 1,721 | 2,206 | 6,539 |
| Group III ($5 to $9) | 7,099 | 2,533 | 1,042 | 1,500 | 4,452 |
| Group IV (Less than $5) | 4,024 | 1,179 | 449 | 738 | 2,870 |
| By control: | | | | | |
| Public | 26,925 | 10,310 | 4,789 | 5,526 | 16,528 |
| Private | 13,575 | 6,709 | 2,899 | 3,822 | 6,857 |

[a] The number of departments reporting students supported from the various sources may differ from the number of departments reporting total graduate students.

[b] Grouped by total Federal obligations received for academic science in institutions, FY 1969.

# APPENDIX D

# 1970 Survey Instruments


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**NATIONAL SCIENCE FOUNDATION**

*Office of the Director*

WASHINGTON, D.C. 20550

April 3, 1970

Dear President:

As you may know, the National Science Foundation conducted a survey last year to identify some of the problems associated with changes in Federal funding patterns for academic science. A sample of institutions was requested to provide information from which we could evaluate the impact of funding changes so that necessary steps could be taken to maximize the strength of academic science in the face of existing budgetary conditions. The responses indicated that several possibly significant downtrends had begun. However, the responses also indicated that the full effects of funding restrictions may have been ameliorated by temporary or stopgap actions which might not be continued in subsequent years. Thus, it was felt that data should be obtained for a longer span of time so the full effect of changes in Federal funding for academic science could be adequately measured. The National Science Foundation has therefore developed a questionnaire covering the impact of the broad spectrum of changes in Federal research and education support patterns in 1969-70.

The questionnaire has been simplified on the basis of last year's experience. Since the "causal events" identified in last year's questionnaire are no longer fully applicable in regard to fiscal year 1970, we now request your replies simply in terms of overall changes in Federal funding. However, it is recognized that time and effort will be involved in completing it. Hopefully, those of you who participated in the survey last year will now find it somewhat easier to respond.

The questionnaire is divided into two parts. Chairmen of departments granting doctorates in the following disciplines should each be requested to complete part I: physics, chemistry, mathematics, electrical engineering, chemical engineering, biochemistry, biological sciences, biology, microbiology, pharmacology, physiology, sociology, economics and psychology. Please see Instructions for more detail concerning selected science departments which are to be covered by part I.

Part II is intended for completion by the central administration. It should be filled out by a person who, in your opinion, will be able to evaluate the impact of the Federal funding changes on the university as a whole. In addition, we request that he also review the questionnaires completed by the department chairmen and add any additional remarks which may contribute to an understanding of the impact of the funding situation on individual departments.

The National Institutes of Health has requested that supplemental information be obtained for medical schools. If your institution has a medical school, please provide the separate data, as explained in the Instructions, to us for transmittal to the National Institutes of Health.

The information gathered in this survey will be used only for developing statistical information for use in connection with Federal policy development and program planning. Individual institutions or departments will not be identified with the data which they report.

We urgently request the cooperation of all institutions in completing the questionnaire and

returning it by May 7, 1970 to the Planning Director, National Science Foundation, 1800 G Street, NW., Washington, D.C. 20550. If you cannot meet the foregoing date, please let us know. If you have any questions concerning the information requested, please write to the Planning Director or call the Science Education Studies Group of the Planning Organization: Area Code 202, 632-4324.

We realize that we are asking you to expend staff effort on this task at a time when many concerns and pressures face the universities. I assure you, however, that the information is of vital importance to the formulation of future Federal programs in support of academic science. Your cooperation is appreciated.

Sincerely,

W. D. McElroy
*Director*

Enclosures

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

# 1970 Survey of Impact of Changes in Federal Science Funding Patterns on Academic Institutions

## Instructions and Definitions for Parts I and II

The National Science Foundation is conducting this survey to develop a better understanding of the impact of recent changes in the levels of Federal funds allocated for the support of academic science. The purpose of this endeavor is to provide objective and, wherever possible, quantitative information on the effects of recent changes in Federal funding levels on research and education in the sciences. Questionnaires for obtaining the information are being sent to a sample of institutions granting doctorates in the sciences.

### Instructions

**Part I** – To be completed by chairmen of departments granting doctorates in the following selected science disciplines:

**Chemistry**

**Physics**: Include only departments designated as physics or physics and astronomy departments. Do not include highly specialized departments such as molecular physics or electrophysics.

**Mathematics**: Do not include departments limited to applied mathematics, computer science, or statistics.

**Electrical engineering**

**Chemical engineering**

**Biochemistry**

**Biology and biological science**: Include only departments designated as "biology" or "biological science" departments. Do not include departments covering only specialized fields such as cellular biology, or molecular biology.

**Microbiology**: Include only departments designated as microbiology or bacteriology

**Pharmacology**

**Physiology**: Include departments of physiology or physiology and other subjects, e.g., "physiology and biophysics."

**Sociology**: Include departments designated as sociology or sociology and anthropology.

**Economics**: Do not include departments of agricultural economics.

**Psychology**: Do not include highly specialized departments or fields of education such as departments of child development, child studies, educational psychology, counseling.

**Part II** (Institution-wide Questionnaire), – Intended for completion by an individual who is able to evaluate the impact of the Federal funding changes on all science* in the university as a whole. Please note that information on part II should *exclude the medical school* and the *Federally Funded Research and Development Centers.* (See next paragraph for separate part II questionnaire for medical schools.) An individual on the central staff should also review the part I questionnaires completed by the department chairmen, adding to the department questionnaire any additional remarks which may contribute to the understanding of the impact of the funding situation.

In the event that your institution has a medical school, please submit a *separate, appropriately identified,* part II questionnaire, covering *all* of the research and education activities of the medical school. Include activities of all science departments as described under definitions plus any other departments in the medical school engaged in research or education in health-related fields. *Do not* include the medical school data in the part II institution-wide questionnaire for which instructions appear in the preceding paragraph.

In order to permit meaningful interpretation of the survey data, it will be necessary to adhere as closely as possible to uniform concepts. Definitions are found below. Unless otherwise stated, funding data should express actual expenditures including indirect costs. Counts of persons are generally requested in terms of the spring of the year. *Fiscal year* data should be reported in terms of the *Government fiscal years,* i.e., July through June[1]

Please answer all questions with the best knowledge available, making estimates and approximations when necessary. If there are any questions concerning the information requested, please write to the **Planning Director, National Science Foundation, 1800 G Street, NW, Washington, D.C. 20550, or call the Science Education Studies Group of the Planning Organization: Area code 202, 632-4324.**

Information gathered in this survey will be used only for developing statistical information for use in connection with Federal policy development and program planning. **Individual institutions or departments will not be identified with the data which they report.**

PLEASE COMPLETE THE QUESTIONNAIRES FOR THE INSTITUTION AND REQUESTED DEPARTMENTS, PACKAGE THEM TOGETHER, AND RETURN TO THE NATIONAL SCIENCE FOUNDATION BY MAY 7, 1970. Please provide all available questionnaires by May 7 and submit other questionnaires as soon as possible thereafter. In order to assist us in maintaining a control on all questionnaires submitted or expected, please indicate on the Cover Sheet enclosed: (1) the selected science departments for which part I questionnaires are submitted and (2) those designated science departments for which questionnaires are not included in the initial submission. A postage free, self-addressed return envelope is enclosed.

---

*See "science departments" under definitions.

[1]The Federal fiscal year 1968 began July 1, 1967; fiscal year 1969 began July 1, 1968; fiscal year 1970 began July 1, 1969.

## Please Note

*To avoid the impression that a response has been omitted inadvertently, please use "none," "not applicable" (or "N.A."), or other appropriate notations to assist in the interpretation of replies.*

*Please use the reverse of the questionnaire pages (with identifying question numbers) to extend remarks.*

*Be sure to enclose the "Cover Sheet" with your submission.*

### Definitions

*Science departments* – Departments offering degrees in the following broad fields: Physical sciences, engineering, computer sciences, mathematical subjects, agriculture and forestry, biosciences, psychology, and social sciences. Social sciences are intended herein to include only anthropology, economics, agricultural economics, sociology, political science, government, linguistics, and geography; do not include history, social work, or other fields.

*Other funds federally earmarked for your department* – Includes all Federal funds designated for your department by a government agency other than for specific research projects. An example is a grant under the NSF Departmental Science Development Program.

*Institutional funds from Federal sources (general or multipurpose) available to departments* – Includes all Federal funds which were not designated for a particular department by a government agency and which were distributed to your department at the discretion of the institution, such as NSF formula program of Institutional Grants for Science, NIH General Research Support Grants, etc.

*Non-Federal funds* – Refers to all funds available to the institution from sources other than Federal Government, such as State funds, endowment earnings, tuition, etc. Federal funds received through a State agency should be treated as Federal funds when possible.

*Postdoctorates* – Includes individuals with appointments of a temporary nature at the postdoctoral level which are intended to offer further education and experience in research, usually, though not necessarily, under the supervision of a senior mentor. Although appointments to Instructor and Assistant Professor are temporary, they are excluded because they are understood to be part of the regular series of academic appointments and normally lead to a tenure position. Candidates studying for another doctorate which does not involve research as a primary activity are also excluded. Include in this category only individuals who received a Ph.D., D.Sc., M.D., or equivalent degree less than 5 years ago.

*Graduate student* – A student who has attained a bachelor's or first-professional degree and is or could be a candidate for a master's or doctor's degree. Do not include regular university professional staff enrolled for advanced degrees.

*A full-time graduate student* is defined here as a graduate student who is engaged entirely in training activities in his field of science; these activities may include study, research, and such teaching or similar activities as are in the institution's opinion contributory to his academic progress.

*A part-time graduate student* is one whose training program (as defined in definition of full-time graduate student) is less than 75 percent of that normally required of full-time graduate students.

*Other professionals*–The term "other professionals" is used herein to include all persons employed at a level requiring at least a baccalaureate degree, other than those classified by the department as faculty, postdoctorates, or graduate students. Do not include persons performing jobs not requiring a baccalaureate degree even though such a person holds this degree or higher.

*Science and engineering technicians*–This term is used to include all persons engaged in technical jobs not requiring a baccalaureate degree.

# 1970 Survey of Impact of Changes in Federal Science Funding Patterns on Academic Institutions

## Cover Sheet

Reports are requested only for departments granting the doctorate degree. Please cross out departments not granting doctorates in your institution, and make appropriate notations for reports submitted or to be submitted. Indicate departments located in medical schools by using an asterisk (*).

| Selected departments | Submitted herewith (check) | To be submitted by (indicate date) |
|---|---|---|
| Chemistry | _____ | _____ |
| Physics | _____ | _____ |
| Mathematics | _____ | _____ |
| Electrical engineering | _____ | _____ |
| Chemical engineering | _____ | _____ |
| Biochemistry | _____ | _____ |
| Biology | _____ | _____ |
| Biological sciences | _____ | _____ |
| Microbiology | _____ | _____ |
| Pharmacology | _____ | _____ |
| Physiology | _____ | _____ |
| Sociology | _____ | _____ |
| Economics | _____ | _____ |
| Psychology | _____ | _____ |

_____

Name of Institution

_____ _____

Person to be called regarding departmental forms to be submitted at a later date. Phone No.

Budget Bureau No. 99S 7000 1
Approval Expires: December 1970

**NATIONAL SCIENCE FOUNDATION**
**WASHINGTON, D.C. 20550**

# 1970 Survey of Impact of Changes in Federal Science Funding Patterns on Academic Institutions

## Part I – Department Questionnaire

Name and location of institution

Department

Name and title of person supplying information

Telephone number

Date

1. Complete the table below showing, by source of funds, the estimated amounts **your department** expended or will expend for research and education in the sciences in FY 1969 and FY 1970. **(Include all costs, e.g., research, instruction, construction, equipment, indirect cost, etc. for your department.)**

| Source of funds | FY 1969 | FY 1970 |
|---|---|---|
| a. All sources | $ | $ |
| b. Federal sources: | | |
| (1) Total | $ | $ |
| (2) Research project grants or contracts | $ | $ |
| (3) Institutional funds from Federal sources (general or multipurpose) and other funds federally earmarked for your department* | $ | $ |
| c. Non-Federal sources* | $ | $ |

*See definitions.

2. a. Was there a change in your department in the distribution made of FY 1970 non-Federal funds* *as compared with FY 1969?*

Yes_____ No_____

b. If "yes," was this change, in your opinion, the result of *changes in Federal funding?*

Yes_____ No_____

c. If "yes" in (b), in which of the following categories did you allocate a substantially greater (at least 20 percent) amount of *non-Federal funds* in FY 1970 as compared with FY 1969?

**(Check all that apply)**

(1) Faculty salaries _____

(2) Graduate student stipends _____

(3) Postdoctorate stipends _____

(4) Other professional salaries _____
**(excludes postdoctorates and graduate students)**

(5) Science and engineering technician salaries_____

(6) Equipment _____

(7) Facilities _____

(8) Supplies _____

(9) Other _____ _____
(specify)

(10) None _____

*See definitions

3. a. How many federally funded research projects were halted in the department in FY 1969 or FY 1970?

| *Halted temporarily*[1] | *Halted entirely*[2] |
|---|---|
| _____ | _____ |

b. In your opinion, how many were halted *because of changes in Federal funding?*

| *Halted temporarily*[1] | *Halted entirely*[2] |
|---|---|
| _____ | _____ |

c. If any projects are reported halted entirely in (b), answer the following: (Total number reported in (1) through (3) below should equal the total reported as halted entirely in 3(b).)

(1) How many are definitely not scheduled for reactivation regardless of the Federal funding situation? _____

(2) How many will be reactivated if, and only if, Federal funds are restored? _____

(3) How many will be reactivated on the basis of support from non-Federal sources? _____

[1] Restarted in FY 1969 or FY 1970.

[2] Not restarted in FY 1969 or FY 1970.

4. Complete the table below showing numbers of individuals in various categories in the spring of 1969 and the spring of 1970.

| | Spring 1969 | | Spring 1970 | |
|---|---|---|---|---|
| | Total[1] | Full-time[2] | Total[1] | Full-time[2] |
| a. Faculty (instructor and above) employed, total | | | | |
| (1) Faculty engaged in Federal project grant or contract research | | | | |
| b. Other professionals employed (exclude postdoctorates and graduate students)*, total | | | | |
| (1) Other professionals engaged in Federal project grant or contract research | | | | |
| c. Postdoctorates, total | | | | |
| (1) Postdoctorates engaged in Federal project grant or contract research | | | | |
| d. Graduate students *registered* in department*, total | | | | |
| (1) Graduate students supported from Federal research project grants or contracts | | | | |
| (2) Other graduate students supported from Federal funds, e.g., fellowships, traineeships, etc. | | | | |
| (3) All other graduate students | | | | |
| e. Science and engineering technicians employed*, total | | | | |
| (1) Science and engineering technicians engaged in Federal project grant or contract research | | | | |

[1] Include full-time and part-time.

[2] Includes staff or students engaged full time in a combination of teaching, study, or research. Thus, if on Federal project part time but employed or registered in department full time, report in full-time column.

*See definitions.

5. How does the total amount of *academic*-year salary for your department's faculty provided *from Federal sources* in FY 1970 compare with FY 1969? (check one item, below)

a. More than 10% greater in FY 1970 _____

b. 0 to 10% more in FY 1970 _____

c. The same in each year _____

d. 0 to 10% less in FY 1970 _____

e. 10% to 25% less in FY 1970 _____

f. More than 25% less in FY 1970 _____

6. a. How many of the department's faculty (question 4a) lost some or all of their own academic-year salary *provided from Federal sources* in FY 1970 (even if made up from other sources)?

(1) Lost some only _____

(2) Lost all _____

b. How many of these, in your opinion, lost this support *because of changes in Federal funding?*

(1) Lost some only _____

(2) Lost all _____

c. For how many faculty reported in (b) as losing some or all salary provided from Federal sources was, or will, the loss be made up in part at least *from non-Federal* sources?*

_____

7. How does the total amount of *summer* salary for your department's faculty expected to be provided *from Federal sources* in the summer of 1970 compare with the summer of 1969?

a. More than 10% greater in summer 1970 _____

b. 0 to 10% more in summer 1970 _____

c. The same in each summer _____

d. 0 to 10% less in summer 1970 _____

e. 10% to 25% less in summer 1970 _____

f. More than 25% less in summer 1970 _____

*See definitions

8. a. How many of the department's faculty (question 4a) do you expect will lose some or all of their own salary *provided from Federal sources* in the summer of 1970 (even if made up from other sources)?

(1) Lose some only _____

(2) Lose all _____

b. How many of these, in your opinion, are expected to lose this support *because of changes in Federal funding?*

(1) Lose some only _____

(2) Lose all _____

c. For how many faculty reported in (b) as losing some or all salary provided from Federal sources will the loss be made up in part at least *from non-Federal* sources?*

_____

9. a. Have faculty in your department spent on the average a greater, a lesser, or about the same proportion of their time engaged in classroom teaching in FY 1970 *as compared with FY 1968?*

Greater in FY 1970 _____

Lesser in FY 1970 _____

About the same _____

b. If a greater or lesser proportion of time is indicated in (a), did this change result *primarily from changes in Federal funding?*

Yes_____ No_____

*See definitions.

10. a. Has your department made any *policy changes since 1968* regarding the number or kind of *new graduate students** which you admit?

Yes_____ No_____

b. Are these changes totally, or in part, the *result of changes in Federal funding?*

No_____ Yes, in part_____ Yes, totally_____

c. If "yes" in (b), please describe the changes.

11. a. Has your department made any *policy changes since 1968* regarding the number or kind of *new postdoctorates** which you accept?

Yes_____ No_____

b. Are these changes totally, or in part, the *result of changes in Federal funding?*

No_____ Yes, in part_____ Yes, totally_____

c. If "yes" in (b), please describe the changes.

*See definitions.

12. a. Has it been necessary for your department to reduce the financial level at which any major *departmental* science research facility operated during FY 1970 *in comparison with FY 1968?*

Yes_____ No_____

b. If "yes" to (a), in your opinion, was this the *result of changes in Federal funding?*

Yes_____ No_____

c. If "yes" to (b), *list all facilities affected by these Federal funding changes* and indicate approximately at what financial level they operated in *FY 1970 as a percent of FY 1968.*

| Major research facilities | FY 1970 level of operation as a percent of FY 1968 |
|---|---|
| | |

13. Indicate how the following budget categories in your department were affected between FY 1969 and FY 1970 by *changes in Federal funding.* Indicate by circling the appropriate numbers below on each line.

| Category | No change | Changed from FY 1969 to FY 1970 | | | | Not relevant |
|---|---|---|---|---|---|---|
| | | Reduced less than 25% | Reduced 25% or more | Increased less than 25% | Increased 25% or more | |
| Travel | 0 | 1 | 2 | 3 | 4 | 5 |
| Equipment | 0 | 1 | 2 | 3 | 4 | 5 |
| Construction | 0 | 1 | 2 | 3 | 4 | 5 |
| Technician salaries | 0 | 1 | 2 | 3 | 4 | 5 |
| Clerical and secretarial salaries | 0 | 1 | 2 | 3 | 4 | 5 |
| Purchase of supplies | 0 | 1 | 2 | 3 | 4 | 5 |
| Publication charges | 0 | 1 | 2 | 3 | 4 | 5 |
| Other _____ (specify) | 0 | 1 | 2 | 3 | 4 | 5 |

14. a. Considering all the research funds available to faculty in your department in FY 1970, is there at this time, in your opinion, *an appropriate split between funds available to young* (7 or less years from Ph.D.) *and senior* (more than 7 years from Ph.D.) staff?

Yes_____ No_____

b. If "no," please explain.

15. a. Has your department *changed its policy or practice* toward initiating proposals for, or accepting awards from, any Federal research program, Federal research training program, Federal science education program, or other Federal science related program?

Yes_____ No_____

b. If "yes" to (a), state type of award or program, nature of policy or practice change, and reason for change for each type of award.

16. Describe *any other major effects* on your department due to changes in Federal funding levels (other than those covered by your previous answers). If there are particular groups (e.g., postdoctorals, senior faculty, graduate students, etc.) who have been affected *more* than others, please state how.

Budget Bureau No. 99S 7000 1
Approval Expires: December 1970

**NATIONAL SCIENCE FOUNDATION**
**WASHINGTON, D.C. 20550**

# 1970 Survey of Impact of Changes in Federal Science Funding Patterns on Academic Institutions

## Part II—Institutionwide Questionnaire

Name and location of institution

Name and title of person supplying information

Telephone number Date

1. Complete the table below showing, by source of funds, the estimated amounts your institution expended or will expend for research and education **in the sciences** in FY 1969 and FY 1970. **(Include all costs, e.g., research, instruction, construction, equipment, indirect costs, etc.)**

| Source of funds | FY 1969 | FY 1970 |
|---|---|---|
| a. All sources ..... | $ | $ |
| b. Federal sources ..... | $ | $ |
| c. Non-Federal sources*..... | $ | $ |

*See definitions.

2. If an *increase* has occurred in *FY 1970 over FY 1969* in the use of *"non-Federal funds"* for academic science *resulting from changes in Federal funding*, check the principal sources of the increase in non-Federal funds used.

Check here if no increase in non-Federal funds or increase in non-Federal funds for academic science not due to changes in Federal funding. ☐

**(Check all that apply)**

a. State governments _____

b. Local governments _____

c. Student tuition and fees _____

d. Endowment earnings _____

e. Endowment principal _____

f. Foundations _____

g. Voluntary health agencies _____

h. Industry _____

i. Gifts from individuals _____

j. Borrowed _____

k. Other _____ _____
(specify)

3. a. Has it been necessary for your institution to reduce the financial level at which any major institutional, interdisciplinary, or interdepartmental science research facility (e.g., computer center) operated during *FY 1970 in comparison with FY 1968*?

Yes_____ No_____

b. If "yes" to (a), in your opinion, was this the *result of changes in Federal funding?*

Yes_____ No_____

c. If "yes" to (b), *list all facilities affected by these Federal funding changes* and indicate approximately at what financial level they operated in *FY 1970 as a percent of FY 1968.*

| Major research facilities | FY 1970 level of operation as a percent of FY 1968 |
|---|---|
| | |

4. a. Have you changed your *overall institutional policies or practices* since FY *1968* toward initiating proposals for, or accepting awards from, any Federal research program, Federal research training program, Federal science education program, or other Federal science related program?

Yes_____ No_____

b. If "yes" to (a), state type of award or program, nature of policy or practice change, and reason for change for each type of award.

5. If science departments or other major science units in your institution were affected in *FY 1970* by the changes in Federal funding, briefly describe the *major effects* for those departments or units *most affected.*

**If none seriously affected, check here.**

**[ ]**

(1) Department:

Major effects:

(2) Department:

Major effects:

(3) Department:

Major effects:

6. *Describe any other major effects* on your institution due to *changes in Federal funding* (other than those covered by your previous answers).





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